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SYPHILIS OF THE STOMACH[1]

ROENTGEN APPEARANCES BEFORE AND AFTER TREATMENT

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FIFTY cases of deformity of the stomach, suggestive of a syphilitic lesion, have been encountered. Thirty have been associated with a positive Wassermann reaction and without doubt are true cases of congenital or acquired syphilis of the stomach. Five of the cases with a negative reaction have died and three on postmortem examination were found to have carcinomatous lesions of the stomach.

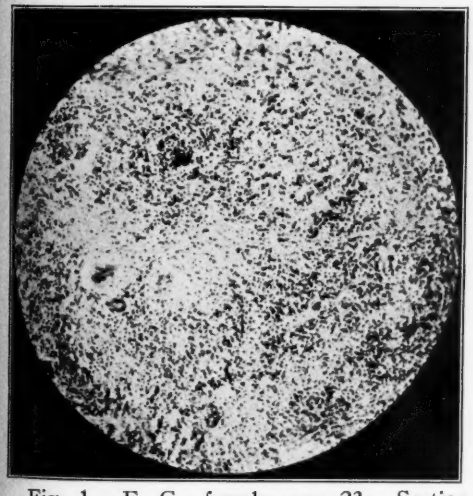

Fig. 1. F. G., female, age 23. Section from stomach wall. Note the presence of giant cells and the infiltration of the stomach wall with round cells. Tuberculous lesion excluded by absence of tubercle bacilli. See Figs. 2 and 3 for appearance of stomach before and after operation.

Fig. 2. F. G. Note deformity of the greater curvature. There was retention in the stomach at the end of 24 hours. For appearance 8 years later, see Fig. 3.

Of the cases associated with a positive Wassermann, a small number were operated on because of extreme stenosis of the stomach. One of these (F. G.) was operated on and a section of the stomach removed, which on microscopic examination showed a typical appearance of syphilitic lesion, with the pres-

[1] Read before the Radiological Society of North America, San Francisco, June, 1923.

ence of giant cells (Fig. 1). A gastro-enterostomy was performed in this case 8 years ago. The appearance at that time indicated infiltration about the pyloric end and greater curvature (Fig. 2), with gastric retention at the end of 24 hours. At present the gastro-enterostomy is working in an efficient manner. On account of the rapid emptying of the stomach through the gastro-enterostomy opening, it is difficult to determine whether infiltration of the distal end of the stomach has entirely disappeared or not, but the appearance would indicate that the infiltration has largely disappeared (Fig. 3). The patient is now in good health.

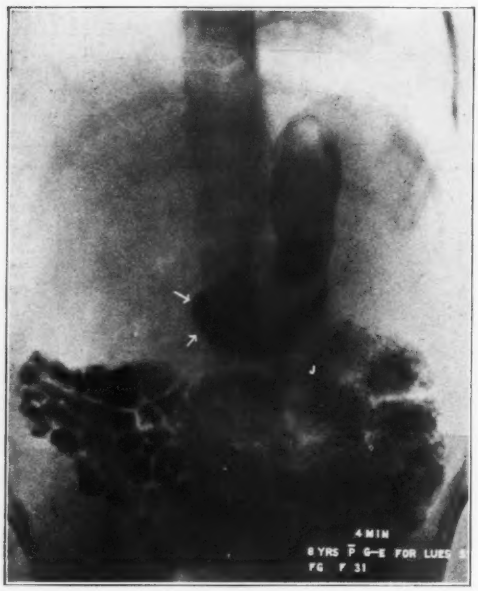

Fig. 3. F. G. Eight years after gastro-enterostomy in case shown in Fig. 2. Note that the deformity about the greater curvature has largely disappeared.

Another case (H. D.), also was operated on, with the performance of a gastro-enterostomy 10 years ago. The appearance at that time showed marked stenosis in the middle of the body of the stomach, producing a dumbbell-like deformity (Fig. 4). At the present time the patient is in excellent health, and the gastro-enterostomy is functioning in an efficient manner. By giving a very thick barium mixture, the esophagus was outlined and still shows some compensatory dilatation, as first observed at the examination 10 years ago (Fig. 5). The cardiac end of the stomach has increased in size.

Fig. 4. H. D., female, age 14. Note the dumbbell-like deformity due to extensive infiltration about the body of the stomach in a case of congenital syphilis.

Just as in cardiospasm, it would appear that, once dilatation of the esophagus has occurred and continued for some time, even though the obstruction is relieved, the dilatation remains (Fig. 5).

Perigastric adhesions were broken up in a third case (G. R.), which was operated on. The patient made a satisfactory recovery from the operation. Two years later an intercurrent nephritis resulted in death.

Several other cases received medical treatment with remarkable benefit. One of these cases (D. F.) showed marked infiltration of the middle of the body of the stomach when first observed 9

years ago (Fig. 6). At the present time the stomach shows remarkable increase in the size of the previously stenosed area (Fig. 7), and the patient at the age of 63 is in excellent health.

Fig. 5. H. D. Lateral exposure, 10 years after gastro-enterostomy. Note that the cardiac end of the stomach has increased in size. The esophagus remains dilated. This condition was present at the time of the operation and compensates for the small size of the stomach. For appearance of stomach before operation, see Fig. 4.

This is especially noteworthy in view of the fact that it is generally believed that, even though a patient with gastric syphilis may be relieved of the symptoms, the deformity of the stomach will remain stationary. Up to the present time this has been largely speculative or based on roentgenographs made after only very short intervals following treatment. It is one of the objects of this paper to show observation after a long interval—several years.

In another case (W. H.), a boy of 17 years (Fig. 8), the deformity of the stomach had entirely disappeared after 3 years (Fig. 9).

In a young woman (M. A.), aged 23 (Fig. 10), a very rapid improvement in the appearance of the stomach was ob-

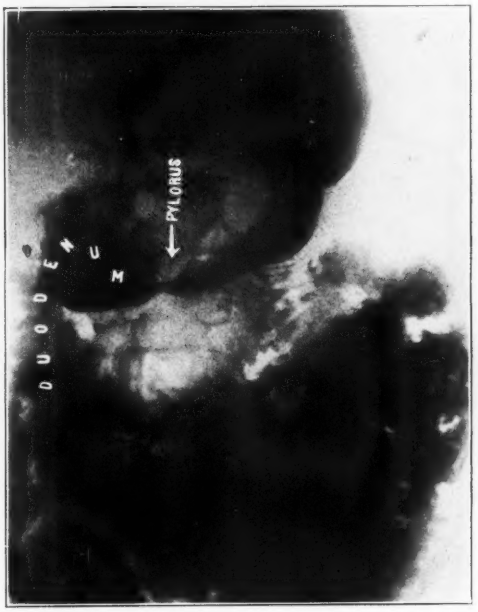

Fig. 6. D. F., male, age 54. Note the marked infiltration of the middle of the stomach. For condition 9 years later, see Fig. 7.

served after relief of the symptoms by medical treatment (Fig. 11).

A personal communication from Dr. A. S. Warthin, of Ann Arbor, states that in 1920, in a case of supposedly ordinary peptic ulcer operated on by Dr. Cabot, spirochetes were demonstrated in great number in the stomach wall and lymph nodes. Dr. Warthin has observed three cases of syphilitic peptic ulcer of the stomach.[2]

Dr. J. W. McNee published an article on syphilis of the stomach in the *Quarterly Journal of Medicine,* Oxford, April, 1922, in which he shows a section of the stomach containing spirochetes (Fig. 12). On account of the im-

[2]Syphilis of the Smaller Arteries. N. Y. Med. Journal, Jan. 18, 1922.

portance of this finding a reproduction has been inserted.

In an attempt to classify the characteristic roentgen appearances of syphilis of the stomach one encounters consid-

Fig. 7. D. F. Same case as shown in Fig. 6, 9 years after medical treatment. Note the remarkable increase in the size of the previously stenosed area.

erable difficulty. There is, however, sufficient evidence to warrant the statement that syphilis of the stomach does give a fairly characteristic appearance in a large number of cases. This may be briefly stated as follows:

1. Deformity of the stomach of fairly symmetrical nature, involving a large portion of the middle of the body of the organ, producing a dumbbell-like appearance. When this appearance is found in a young individual, or in an older individual without the characteristic appearances of cachexia, commensurate with a malignant involvement of the stomach of the extent indicated by the roentgen findings, syphilis of the stomach should always be suspected, and if a positive Wassermann is obtained, the diagnosis is established with reasonable certainty.

2. In cases showing a remarkably small tubular stomach, commonly spoken of as linitis plastica, or "leather-bot-

Fig. 8. W. H., male, age 17. Note the deformity of the greater curvature in a case of congenital syphilis.

tle" stomach, the problem is more difficult, as this condition even in young individuals may denote carcinoma of the stomach. In other instances the condition may be one of fibromatosis. In other cases it may be due to syphilis.

3. In another class of cases the roentgen appearances are very similar to those found in carcinoma of the stomach and consist of localized areas of infiltration of the stomach wall.

4. The lesion may be situated at the pylorus and produce marked stenosis and gastric retention. In this respect the condition resembles that observed in ulcer or carcinoma of the stomach.

Fig. 9. W. H. Case shown in Fig. 8, 3 years after medical treatment. The deformity has entirely disappeared.

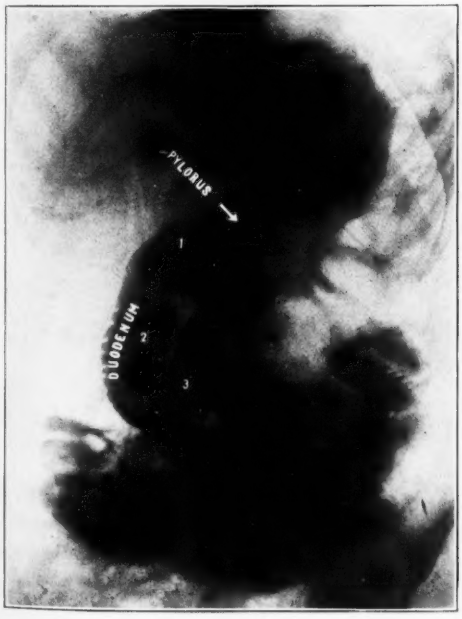

Fig. 10. M. A., female, age 23. Note the exceedingly small size of the stomach and the very rapid emptying.

Fig. 11. M. A. Case shown in Fig. 10, 5 months after medical treatment. Note the increased size of the stomach and the normal rate of emptying.

5. Perigastric adhesions may produce deformity of the body of the stomach simulating an hour-glass stomach due to ulcer. In the absence of a definite ulcer crater or niche and

Fig. 12. From case reported by Dr. J. W. McNee. Section showing spirochetes from syphilitic ulcers of the stomach. (*Journal of Medicine*, Oxford, April, 1922.)

the presence of a positive Wassermann reaction, the appearance would suggest syphilis of the stomach.

CONCLUSIONS

1. Syphilitic infiltration of the stomach yields to active anti-syphilitic treatment so that, after several years, the stomach may resume an almost natural contour. Its emptying time may become almost normal.

2. Syphilis of the stomach, operated upon conservatively by means of gastro-enterostomy, shows good response to this method, and is not likely to be followed by complications, no case of gastrojejunal ulcer having been observed.

ABSTRACTS OF CURRENT LITERATURE

Kaufmann, Jacob: The Role of Spasticity in Diseases of the Digestive Tract. *Am. Jour. Med. Sci.*, 1923, clxvi, 67.

Mention is made of the various forms of spasticity associated with organic lesions. Spastic manifestations, both at the site of organic lesions and remote from them, have long been known. Roentgenology has emphasized their importance and has pointed out the frequency of their occurrence. Attention is called to another form of spasm, unassociated with organic disease either locally or elsewhere in the body, where the spasmodic manifestations are the result of general constitutional disorders. In support of this theory observations are quoted where removal of the appendix failed to relieve paroxysmal pains in the abdomen and where the removal of a gall bladder filled with stones failed to relieve pain, in reality due to spasmodic colic. The possibility of an error in calcium metabolism being the causative effect in these spasmodic disorders is brought out, and the detailed report of a case of visceral tetany with spastic manifestations unrelieved by repeated operation, but relieved at once by intravenous calcium medication, is presented. In conclusion, the essayist believes that not only are many abdominal pains and colics due to spasm of the abdominal viscera, with or without actual organic disease, but also a great many are due to spasm alone, unassociated with actual organic lesion.

Hirsch, Edwin F., and Petersen, A. J.: The Blood with Deep Roentgen Ray Therapy. *Jour. A. M. A.*, 1923, lxxx, 1505.

The authors undertook a chemical study of the blood of patients who had been treated with high voltage roentgen rays in the hope of demonstrating changes which might explain roentgen ray sickness.

The urea nitrogen, the total non-protein nitrogen, the uric acid, the creatinin and the sugar of the blood were determined, using Folin and Wu's methods; the carbondioxid combining power of the blood plasma according to Van Slyke, and the hydrogen-ion concentration of the whole defibrinated blood by the gas chain method.

The examination demonstrated no striking or consistent alteration in the urea nitrogen, the total non-protein nitrogen, the uric acid, the creatinin or the sugar concentration in the blood of patients treated with roentgen rays. There was, however, a disturbance of the acid base equilibrium manifested shortly after treatment by an increase of the hydrogen-ion concentration and by a slight lowering of the alkali reserve (acidosis). After 24 hours these relationships become reversed, with a diminished hydrogen-ion concentration and an increased alkali reserve (alkalosis), which persists for several days.

K. S. DAVIS.

THE APPLICATION OF RADIUM IN OPERABLE OR BORDERLINE CASES OF CARCINOMA OF THE CERVIX UTERI BEFORE OPERATION[1]

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I HAVE tried to estimate the quantity of radium, the number of applications, the milligram hours of each application, the necessary total dose, the interval between applications, and the most effective interval from the first application to the day of operation that would most favorably influence the lesion, and avoid any possible chance of damaging it for a recognized surgical procedure in operable or borderline cases of carcinoma of the cervix.

In order to improve results, surgeons, as a rule, supplement the total abdominal hysterectomy by first applying heat in some form. The simple cautery and the Percy cautery are probably the chief recognized methods of local destruction of the diseased area.

Ross studied 475 cases of cancer of the uterine cervix seen at the Mayo Clinic between January 1, 1912, and January 1, 1919. He says: "Delayed hysterectomy gave better results than immediate hysterectomy in conjunction with the simple cautery and the Percy cautery. Furthermore, total abdominal hysterectomy and vaginal hysterectomy, when supported by radium, gave almost identical results, which were apparently slightly better than from either agent alone.... Twenty patients with early lesions were treated by surgery alone: nine are dead, seven are living, and information is lacking in four cases. Nine had lived four years after treatment and six had lived five years after treatment.... Of the eleven patients who lived more than five years, ten were treated surgically. Two of the three treated by radium who have been traced, were living three years later. The third lived one and one-half years. Both patients treated by simple cautery and radium are living, one three years and the other four years after treatment. It is thus apparent that in early cases the various types of treatment give similar results; it remains for time to prove the durability of results wherein radium was employed." Our present standard of judgment, based on the results in the inoperable cases, leads us to believe that these patients were treated inadequately, and that the interval between treatment and surgical interference was too short. It is satisfying to know that the treatment was effective even though insufficient; possibly the chief factor of defeat was the short interval between radium treatment and operation.

Since the application of heat before operation is not altogether satisfactory in the management of operable cases of carcinoma of the cervix, other procedures must be investigated, particularly since it is known that cancer of the cervix remains local for a considerable time. Leitch, in a review of 915 necropsies on patients dying from the disease, found hydronephrosis in 75 per cent. He estimated the duration from the onset of symptoms to death, as twenty-one months. Regional lymph nodes were involved in only 38.36 per cent, although this percentage is probably too low if judged by the collected

[1]Read at the Semi-annual meeting of Radiological Society of North America, San Francisco, June 22-23, 1923.

statistics of Doderlein. These patients die of cachexia and uremia rather than extensive metastatic cancer. Such facts are extremely important in the therapeutic management, since the local lesion must be completely destroyed and the part thoroughly healed to avoid local recurrence and traumatic dissemination by the necessary surgical manipulation. It should also reduce to a minimum the chance of local infection and generalized peritonitis.

Our present knowledge of radium treatment urgently demands an important place in measures sought by the surgeon for the purpose of combating carcinoma of the cervix, as well as malignancy in general. In the advanced or inoperable cases, radium is superior to all other forms of treatment. Marked local healing occurs in some instances, and all patients are benefited. A fair assurance that patients will live six weeks, which is usually a sufficient interval for slight local healing or repair to occur, is sufficient to warrant the treatment. Palliation is all that can reasonably be expected from any type of treatment in the management of these seemingly hopeless cases. It is my experience that when the local growth is adequately treated, healing occurs promptly in the area to which the radium is applied, and the chief factor responsible for the inevitable poor prognosis is the local extension, or the metastasis within the cavities of the body.

From the foregoing data, it is rational and fair to conclude that the neoplastic growth in operable and borderline cases, if adequate treatment is given and sufficient time is allowed, will be destroyed, and if the lesion is limited to the cervix, that is, if it is local, the result should endure. As a pre-operative measure this will meet the most exacting demands of the surgeon.

Following the ordinary application of heat, the change in tissue is a simple inflammatory reaction. The destruction of the neoplasm by radium rays results in a definite or specific tissue reaction, an orderly process fundamentally more effective than the simple inflammatory reaction following the application of heat. Medullary tumors show a gross change at the end of the second or third day. The first change is of color. Such tumors are devoid of the glistening reddish-pink common to healthy newgrowths. Later a grayish-white exudate forms on the surface. Microscopically, the cell is spherical. The cell wall and nuclear membrane are greatly distended and hydremic in appearance, and take the ordinary stains poorly. The edema increases, and finally the cell membrane breaks, scattering the nuclear material and cytoplasm. From this time on organization occurs. The nuclear particles collect into masses and a gradual process of phagocytosis and absorption of the debris takes place, and later, the invasion of wandering plasma and young connective-tissue cells. The cytoplasm forms the basis for new material which is hyalin, pink-staining and without structure. The ordinary tissue changes common to necrosis are not present. In this hyalinoid substance, new lymph spaces, capillaries and blood vessels form. Eventually, provided the treatment has been sufficient and the time interval long enough, active carcinoma cells will not be found. Fibrosis is the outstanding characteristic in the microscopic fields, and if the part has not been over-treated, the amount should not be excessive. Besides this local change there is a general systemic reaction, more complex in all its details and probably of equal importance. It may be divided into two phases. The initial or early phase is characterized by anorexia, nausea, vomiting and weakness. The onset varies from four to twenty-four hours following the application of radium, and may last for a

few hours or a few days. The second phase is characterized by a feeling of well-being. It is most pronounced in the inoperable cases when the general health has been undermined. Patients regain their strength, the appetite returns, they rest better, and pain often disappears. Eventually all the original symptoms and signs fade away; in short, the body defence factors have been stimulated. Every effort should be made to cause local absorption of the neoplasm and yet preserve those factors so essential in restoring the patient's defence. The treatment, therefore, must be individual. Observing the growth at each application and noting the amount of reduction or "melting," furnish a good index to guide the radium treatment.

The number of patients suitable for thorough and effective treatment is unfortunately very small when compared to the number of borderline and inoperable cases. The laity must be trained to appreciate the early signs of malignancy. Such knowledge should not be difficult to impart, especially in cases of pelvic malignancy in the female. Menstruation should remind women regularly of the state of the reproductive and allied structures. Should alterations or irregularities occur, their suspicions should be aroused and competent medical advice sought immediately. The physician who first sees the patient is most responsible. If necessary, every scientific method should be instituted in order to make the diagnosis. A simple cervical lesion may resemble early carcinoma. The history, careful bimanual and visual examination, and a satisfactory specimen for microscopic study are the most reliable methods of establishing a diagnosis. A bimanual pelvic examination alone for the purpose of differentiating a simple lesion of the cervix, such as cystic cervicitis, old lacerations, erosion, or early carcinoma, is not adequate. The findings are practically the same: a variable amount of induration in the cervix, and probably blood on the examining finger. Visualization of the part is an extremely valuable and important aid in the diagnosis. With the proper knee-chest position, the labial structures separate and the inrush of air inflates the vaginal cavity. By means of a Sims' speculum carefully inserted into the vagina, the perineal body is lifted upward; this will produce, in the multipara, a vaginal opening sufficiently large for examination and treatment, while in the nullipara, a very satisfactory substitute for the Sims' speculum is a metal tongue depressor. Its insertion and the moderate traction of the parts is not painful. A direct light will illuminate the vaginal cavity and permit detailed examination of the cervix and the walls of the vagina. It is not always possible, however, to detect early carcinoma in this manner, and a specimen should be carefully removed for pathologic examination. The specimen should contain all of the superficial layers and a portion of the deep layers of the cervical tissues. I remove it with a sharp cutting instrument. A 50-mg. tube of radium should be immediately applied to the area.

The classification used in this study is that furnished by the American College of Surgeons in the abstract record sheet designed for a detailed study of cases of carcinoma of the cervix. (See next page.)

Fourteen cases of primary carcinoma of the cervix were selected for consideration from a larger group. In four cases the disease was limited to the vaginal face of the cervix; in nine the lesion involved the vaginal wall or uterine cavity. In one case there was a history of characteristic backache, and later, of pain referred down the right leg. It is probable that the disease involved the right broad ligament.

1. Primary.
2. Recurrence in the vaginal wall following panhysterectomy for cancer.
3. Recurrence deep in the pelvis following panhysterectomy.
4. Carcinoma of cervix following supracervical hysterectomy.

A. Disease limited to the cervix.
B. Disease involving the uterine cavity or vaginal wall.
C. Disease involving the broad ligaments.
D. Wide fixation, remote metastasis.

These cases may be further grouped into those in which carcinoma was not found at operation, and those in which it was found. The selection of this group of cases was tedious, and the data will probably be misleading, since the amount of involvement of the vaginal wall, cervical and uterine canal and broad ligaments could not be definitely determined; hence the inevitable grave apprehension with regard to the ultimate outcome. As a rule, cases unfavorable for operation at the time they are first seen should be treated with radium alone. However, the fact that treatment was effective in spite of this unfavorable outlook accounts for the classification suggested in Tables 1 and 2. As is shown in the tables, the patients were so much improved as to warrant radical surgical interference, and the results were sufficient to justify the procedure. Four patients had had operations either directly or indirectly on the cervix, but the pathologic report did not then reveal the presence of malignancy. The entire group is small from which to draw conclusions, but weight is added to the data when combined with the findings in the grossly inoperable group in which there were good local results. (See pp. 203, 205.)

TECHNIQUE OF APPLYING RADIUM

The universal tube applicator, walls 0.5 mm. of silver, containing 50 mg. of radium sulphate, was used for preoperative treatments in the majority of cases. A brass tube applicator, walls 0.75 mm. thick, containing emanation in small glass capillary tubes, was applied in a few instances. Therapeutically the energy is equal in both applicators, provided the millicuries balance the milligrams.

The first application was placed just within the cervical canal. The tube measured 2.5 cm. long, thus irradiating a like depth of the cervical tissue. No added filtration was used. The vaginal cavity was packed with gauze. The radium remained in position for fourteen hours. The application was repeated following an interval of from two to three days. If the lesion was limited to the vaginal face of the cervix, three or four applications were given; if the lesion had extended to the vaginal walls or into the cervical canal, the second 2.5 cm. depth of the canal was treated with at least two applications. In two cases the third 2.5 cm. depth was treated. At least two applications are indicated for each 2.5 cm. depth. In one case a tandem of three tubes, held together with a rubber tube 1 mm. thick, was used. The total length of this applicator was about 7.5 cm., the average length of the cervico-uterine canal. The time of this application was twenty hours.

The vaginal applicator was applied in five cases. It is made up of a hard rubber shell, walls 3 mm. thick, and a brass shell 1 mm. thick, and covered with a finger cot. This affords ample filtration for a 50-mg. tube. The time of application was fourteen hours. The number of applications varied from one to three.

In the postoperative treatments, the applicator of choice was the vaginal pack mentioned. Not more than three applications were given. If the edges of the vaginal stump were gaping, an unfiltered universal tube was placed in

TABLE 1

Radium treatment in cases clinically diagnosed carcinoma: not proved at operation

Case	Biopsy report	Location	Treatment, days	Days since last treatment	Days between treatment and operation	Radium technique											Operative technique	Difficulties encountered	Pathologic report	Remarks
						Applicator	Screening, mm.			Location	Mg.	Applications	Day interval	Hours	Total hours					
							Silver	Brass	Hard rubber											
A244772 M. B.	Epithelioma	Cervix, vaginal wall (slight)	1	20	21	Vaginal	0.5	1.0	2.5	Vagina	50	1		14	700	Total abdominal hysterectomy	"Scarring from removal of specimen and radium. No evidene of malignancy"	No epithelioma found. Marked fibrosis and lymphocytic infiltration.	"Mild Percy" elsewhere 8-28-18. One hundred ninety-three days after operation two treatments of radium by vagina, fourteen hours each. Fifty-six months later apparently cured.
A325771 P. D.	Epithelioma	Cervix, vaginal wall (slight)	11	7	18	Universal tube	0.5			Cervix	50 and 66 mc.	4	4-3-4	11 14	2826	Vaginal cuff 5.8 cm. removed with cautery. Total abdominal hysterectomy	None	No carcinoma found after cautery.	Right oophorectomy, appendectomy and myomectomy elsewhere, 1919. Twenty days after operation, fourteen hours radium by vagina; two series of X-ray. Thirty-three months later apparently cured.
A356859 J. F. B.	Epithelioma	Cervix, vaginal wall (slight)	13 131	200	331	Universal tube, vaginal	0.5	1.0	2.5	Cervix vagina uterus	50 50 50	6	2-3-4-3 131	14 20	5800 2000	Cervix removed with cautery. Total abdominal hysterectomy	None	Fibrosis extending into body of uterus. Most o cervix destroyed. No carcinoma found.	Given one series of X-ray treatments. Twenty-four months after operation patient apparently cured.
A357778 H. G.	Inflammatory	Cervix uterine canal (slight)	12	7	19	Universal tube	0.5			Cervix uterus	50 50 50 50	4	4-4 4	14 20	5100	Total abdominal hysterectomy	None	No carcinoma found.	Sacral backache on admission, pain in back radiating down right leg. Twenty-four months after treatment much improved.
A368975 J. F.	Adenocarcinoma	Cervix, vaginal wall (slight)	16	26	42	Universal tube, vaginal	0.5	1.0	2.5	Cervix vagina	50	6	3-4 2-4 3	14	4200	Total abdominal hysterectomy	"Operation not especially difficult."	Area of necrosis at site of carcinoma. No carcinoma found.	Thirty-five days after operation two treatments with radium of fourteen hours each by vagina, one universal tube; one series of X-ray. Thirty-one months later patient apparently cured.

the bottom of the healing area for fourteen hours, one vaginal application being omitted.

The knee-chest position is the most satisfactory, since it furnishes a good exposure of the part to be treated; the radium can be placed without undue trauma. The vaginal cavity is more easily packed with gauze, thus affording sufficient distance between the applicator and the normal adjacent structures. The position also permits the selection of an area from which a specimen may be taken for pathological study. A pathologist may report inflammatory tissue, when the original lesion is grossly malignant; a specimen taken from the deeper portions of the newgrowth would afford material from which to make a positive microscopic diagnosis. Specimens are removed with a sharp cutting instrument and placed immediately in 10 per cent formalin solution. The area is swabbed free of blood and 7 per cent tincture of iodin applied. The radium tube is placed as close as possible to the area from which the specimen has been removed. Hemorrhage, infection, and dissemination of the neoplasm are possible. Packing will usually control the bleeding. The iodin and the usual surgical measures employed with removal of specimens will reduce the chance of infection to a minimum. Dissemination will be less likely to occur if the specimen is removed at the time of the second application of radium.

Five cases in the series demonstrate that if the radium treatment is sufficient and the interval between the first application and the operation is adequate, carcinoma will not be found at the operation. The time element is probably the most important; an astonishing amount of local healing will occur following one application. In the nine cases in which carcinoma was found at operation, either the radium was inadequate or the time interval was too short.

In general, if the lesion is limited to the cervix, at least four cervical applications should be given, using a bare 50-mg. universal tube, time fourteen hours, and the interval between treatments two or three days. If the lesion has spread to the vaginal wall, at least six applications are indicated. One of these should be the tandem of two or three tubes and should radiate the entire length of the cervical and uterine canal. The time of application may vary from fourteen to twenty hours, depending on the extent of the local growth.

To decide the proper time for operation in each case demands constant observation and individual treatment. The medullary type of growth responds rapidly, the scirrhous type, slowly. The interval should be at least from four to six weeks in the rapidly healing type and six to eight weeks in the slowly healing type. The number of cases is too meager from which to draw definite conclusions. This interval should not add any special difficulties to the surgical procedure indicated. The difficulties encountered were in the cases in which other surgical measures had been carried out months or years before total abdominal hysterectomy was performed. The only case in which radium was attributed as a possible factor in producing fibrosis was the one in which the 416 mg. hours of radium was placed in the fundus of the uterus, which would be several centimeters from the involved cervical tissue. It is doubtful whether this amount of radium would produce marked fibrosis, although it cannot be entirely ruled out. Theoretically, as well as practically, no difficulties should be encountered from the treatment recommended, and if the intervals are sufficient, the case should be improved for operation, since we know that the smaller blood ves-

TABLE 2

Radium treatment in cases clinically diagnosed carcinoma: proved at operation

Case	Biopsy report	Location	Treatment, days	Days since last treatment	Days between treatment and operation	Radium technique											Operative technique	Difficulties encountered	Pathologic report	Remarks
						Applicator	Screening, mm. Silver	Brass	Hard rubber	Location	Mg.	Applications	Day interval	Hours	Total hours					
A10550 W. C. P.	Malignant (U.ofM.) Inflammatory (M. C.)	Cervix, vaginal wall (slight)	4	26	30	Universal tube	0.5			Cervix	50	2	4	14	1400		Total abdominal hysterectomy	None	Epithelioma of cervix (Grade 2).	Amputation of cervix and external Alexander, 1908. Nineteen months after treatment patient in good condition.
A175658 A. F. J.	Epithelioma	Cervix, vaginal wall (slight)	13	5	18	Universal tube	0.5			Cervix	50	4	7-3 3	14	2800		Total abdominal hysterectomy	None	Partial necrosis (3 by 3 cm.) Some epithelioma still in area. Epithelioma of cervix (Grade 4.)	Four hundred thirty-six days after operation three treatments of radium by vagina; fourteen hours each; one series of X-ray. Patient died from carcinoma eighteen months after operation.
A271183 B. F. C.		Cervix, vaginal wall (slight)	1	172	173	Vaginal	0.5	1.0	2.5	Vagina	50	1		14	700		Vaginal hysterectomy	None	Epithelioma of cervix.	Seventeen days after operation, three treatments of radium by vagina, fourteen hours each. Forty-one months after treatment patient died from carcinoma
A296040 C. A.		Cervix, vaginal wall (slight)	1	129	130	Universal tube	0.5			Uterus	32	1		13	416		Total abdominal hysterectomy, cervix resected with cautery.	Operation difficult; scar tissue hard to cut.	Adenocarcinoma of cervix.	Amputation of cervix, 1917. Dilatation and curettage, 1919. Report negative. Radium applied in uterine cavity 32 mc. for thirteen hours. Nineteen days after operation one treatment of radium by vagina, fourteen hours; nine series of X-rays. Forty-three months after treatment patient apparently cured.
A311035 R. D.		Cervix, vaginal wall (slight)	3	4	7	Universal tube, vaginal	0.5	1.0	2.5	Cervix; vagina	50	2	3	14	1400		Total abdominal hysterectomy	None	Adenocarcinoma.	Twenty-two months after operation four (20, 14, 4 hrs.) treatments by vagina and rectum. Thirty-nine months after treatment patient died from carcinoma.
A329721 E. L. B.	Epithelioma	Cervix	3	5	8	Universal tube	0.5			Cervix	67 79 mc.	2	3	14 11	1817		Total abdominal hysterectomy	None	Epithelioma (Grade 3).	Nineteen days after operation, three treatments of radium by vagina, fourteen hours each; six series of X-ray. Thirty-three months after treatment patient was much improved.
A335208 N. N.	Epithelioma	Cervix	9	5	14	Universal tube	0.5			Cervix	50	4	3-3 3	14	2800		Total abdominal hysterectomy.	None	Few areas of epithelioma (Grade 3) found in cervix	Dilatation and curettage negative from cervix. Epithelioma. Thirty-one months after treatment patient in good condition.
A373307 A. H. F.	Epithelioma	Cervix	4	3	7	Universal tube	0.5			Cervix	50	1		22	1100		Total abdominal hysterectomy.	None	Marked destruction, small patches of epithelioma(Grade 3) remaining.	Carcinoma, cystadenoma, cystic and solid areas of right ovary. Twenty days after operation, three treatments of radium by vagina, fourteen hours each; one series of X-ray. Nineteen months after treatment patient apparently cured.
A409320 J. B. F.	Epithelioma	Cervix	1	4	5	Universal tube	0.5			Cervix	50	1		14	1400		Total abdominal hysterectomy.	None	Epithelioma of cervix (Grade 3).	Papillary cystadenoma of both ovaries. Seventeen days after operation, three treatments of radium by vagina, fourteen hours each; one series of X-ray. Six months after treatment patient apparently cured.

sels and capillaries are among the first structures to be influenced by the treatment. This would account for the lack of oozing from tissues. The time interval was sufficient, and yet not long enough to allow the fibrous tissue produced by the treatment to become firm and fixed, thus the fascial planes separated easily. Since the quantity of radium which will kill a carcinoma cell will also stimulate fibrotic change, it is important to avoid over-dosage. Applications should be watched, in order that the interval between the first irradiation and the operation may be properly timed. This is a tedious procedure and demands the thorough, painstaking co-operation of the radiotherapist and the surgeon. The technique does not demand complete hospitalization. The patient remains in bed only during the time of application. The only preparation is fasting and a sterile water vaginal douche. The patient leaves the hospital the following morning and is instructed to return for another treatment in two or three days. Slight systemic reactions may occur, but they are very mild and do not demand treatment.

OPERATION

Until it can be demonstrated that the duration of apparent cures from radium treatment is equal to that from surgical procedures, total abdominal hysterectomy is justifiable, following the preliminary management described here; further, this operation removes the tissue involved, and thus prevents actual recurrence.

The postoperative complications were practically *nil*. No painful or distressing sequelæ were present, such as vesicovaginal and rectovaginal fistulas. In two cases malignant ovarian tumors were encountered and removed, which alone would justify exploration.

The cases for the combined radium and surgical treatment should be well selected and judiciously handled. The operation should be total abdominal hysterectomy, and of the Wertheim type.

As a pre-operative procedure roentgen ray was not considered, since the radium was placed directly into the involved area. The so-called high voltage equipment was not then available, but theoretically it should supplement the radium, and will be advised in future cases. As a postoperative measure it is recommended in all cases, provided the general condition of the patient will permit. As yet the systemic and local reaction has been less with the higher voltage.

CONCLUSIONS

1. Early carcinoma of the cervix is a rare clinical finding. A bimanual examination alone, no matter how carefully performed, is not sufficient to make the diagnosis. The knee-chest position, Sims' speculum, and a direct light are most helpful and should be used routinely. Proper biopsy material should be removed for study at the time of the radium applications.

2. If the lesion is adequately treated with radium, and a sufficient interval between the first application and total abdominal hysterectomy follows, active carcinoma cells will not be found on miscroscopical study of the specimen removed. Response to radium varies in cases; individual treatment, therefore, must be given. Fifty mg. of radium in the universal tube applicator, placed in the anterior portion of the cervical canal in early carcinoma for fourteen hours, repeated four times at intervals of three days, and followed by total abdominal hysterectomy in from four to six weeks after the first application, seems to be the most desirable procedure.

3. As a pre-operative procedure, radium treatment is by all means the most effective. It destroys the neo-

plasm, and calls forth the natural defence mechanism of the body. If cases of primary carcinoma of the cervix are subjected to such treatment, special difficulties will not be added to the operation.

4. A total abdominal hysterectomy following the radium treatments is a justifiable procedure, since it deals most effectively with the local pathologic condition, and also deals with other pelvic lesions that may be found at the time of operation.

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DISCUSSION

Dr. C. B. Ward, Spokane, Washington: I wish to compliment Dr. Bowing on this very interesting paper. It is unusually conservative; the cases were well selected and I am sure the method has a future.

I noted that the dose Dr. Bowing recommends is approximately 3,000 milligram hours. This dosage of radium would give a little less than an erythema dose at two centimeters distance and less than 5 per cent of an erythema dose on the skin surface of the anterior abdominal wall. All the tissue more than three centimeters away from the radium would receive less than 45 per cent. Some of the German writers believe that this dosage stimulates the growth of cancer cells.

Carcinoma of the cervix is quite radio-sensitive and I believe it is very difficult to give it a stimulating dose. The rule is, the more radio-sensitive the tissue, the more difficult it is to give a stimulating dose. Plants are not radio-sensitive and it is easy to stimulate their growth with X-ray.

I believe it is easier to stimulate a breast carcinoma than it is a uterine carcinoma. Some interesting cases of apparent stimulation of breast carcinoma were reported at the annual meeting in Germany last year. This stimulation occurred at the margin of the treated areas. The excellent clinical results obtained by radium treatment in this country would indicate that there is no harmful stimulation of uterine carcinoma. However, radium does not give an effective dosage over any considerable area and I believe that it would be well to add X-ray treatment to the radium treatment which Dr. Bowing suggested. This would necessitate increasing the interval before operation from four to six weeks.

Just before leaving home, I had a case in which an extensive pelvic operation was done two weeks after the X-ray treatment. A fecal fistula resulted and there was extensive sloughing of the tissues. The surgeon was unwilling to wait longer in this case. I believe, however, that six weeks would be a safe interval.

The French think carcinoma of the cervix can be given a stimulating dose and they give a small dose of radium and then repeat it, the idea being that the first dose stimulates, the cell takes on a more active growth and becomes more susceptible to the second and third doses, and Dr. Bowing's method may be somewhat along the same line. In this connection I would call attention to the X-ray treatment at Erlangen, where they treat once and again in six weeks, first treating the cervix and then the adnexa, though there is considerable overlapping of areas. They think this division of dosage is important; that the first dose may stimulate and make the growth more susceptible to the second treatment.

Dr. Bowing spoke of uniform improvement in carcinoma of the cervix after radium. In X-ray therapy, improvement is not uniform. You can have two cases exactly alike to all appearances and if you treat with the X-ray and not with radium you may get a good effect in one case and practically no effect whatever in the other, because one is radio-sensitive and the other is not. The radium overcomes this factor by giving a heavy dose over a limited area and the patient who is not radio-sensitive shows improvement.

I think the Doctor is right in allowing the macroscopic appearance to overrule the microscopic report occasionally. We have all seen cases with the uterus fixed and with every appearance of carcinoma, and yet the laboratory report comes back negative. Nothing else gives the clinical picture of advanced carcinoma of the cervix. In taking two sections I often get a positive report in one and not in the other, when I could not tell which one would be more likely to show the lesion.

I would like to speak of the work they were doing in Erlangen with X-ray. It was very fine indeed. They showed me the history and physical findings from the physician who referred the case. I was permitted to examine some patients and it was remarkable how large a percentage of them would clear up from the X-ray. As we have been using the combination of X-ray and radium, I was surprised to see such good results from X-ray alone.

Dr. Henry Schmitz, Chicago: The paper was very valuable, especially the points Dr. Bowing brought out in regard to treatment of carcinoma of the cervix. The clinical diagnosis must always be made by bimanual examination and by inspection and we base our suspicions on the symptom triad: discharge, hemorrhage, and pain. A patient, of whatever age, that presents herself with any one of the symptoms or a combination of any two, should be carefully examined and carcinoma ruled out by microscopic evidence. Only then would we regard the case as benign. If the patient comes with post-climacteric hemorrhage, we always consider that case as clinically malignant, no matter what the report of the pathologist may be. Therefore we treat her as we would a carcinoma. We have had several instances in which we depended upon the pathological report and treated the patients for benign pathology. To our dismay such cases returned in a few months with well developed carcinomata. Therefore we treat them all as carcinoma when they appear with bleeding or hemorrhage after the menopause, whether the pathologist reports malignancy or not.

We have adopted it a rule if the cervix looks suspicious, or if it is impossible to make a clinical diagnosis of carcinoma, to excise the cervix with a cautery and then from a study of serial sections, rule out or make the diagnosis of carcinoma.

In the histologic classification, we have adopted the classification of Schottlaender and Hermann of solid and glandular carcinomata. The solid are divided into unripe and middle ripe basal-celled and squamous-celled, and the glandular into the adenoma glandulare and the adeno-carcinoma. In looking over our pathological slides we find about 15 per cent composed of the unripe spindle-cell variety, about 25 per cent of glandular structure, and about 60 per cent of squamous cells. The latter include the middle ripe basal-celled type which should be placed with the squamous-cell cancers. In comparing the results of radiation treatment in the three classes of cancer, assuming that the law of Tribondeau and Bergonie is correct, we found that the basal-cell type cancer requires much

less radiation for destruction. The true epithelioma or squamous-cell type requires almost 75 per cent E. SD and the cylindrical cell type about 130 to 150 per cent E. SD. It is not only necessary to make a microscopic examination and histological classification, but we should group the cases. I agree with Dr. Bowing that the grouping used by the College of Surgeons is good and should be adopted by the medical profession for the sake of uniformity. Then, too, the prognosis of any treatment must be based on the extent of the malignant growth.

When should we operate? We had fourteen clearly localized cases of cervical carcinoma. They were poor surgical risks, being complicated with diabetes mellitus, decompensated heart disease, nephritis, high blood pressure and so on. They were treated with radiations only. We obtained six five-year cures free from any recurrence. In other words, if we take the surgeon's word we have six absolutely cured cases. That is, better than 40 per cent. If this is a fact, should we then after the application of radium and X-ray resort to operation? Personally, I feel that if I have used radiation, operations are not necessary any more. This dictum holds good only for uterine cancers. In cancers of other parts of the body we advise operation afterwards.

If radiations have been used, how soon could we afterwards operate? It is a very difficult question to decide. With a dose of 3600 milligram element hours of radium we will produce fibrosis. It cannot be prevented, and will become more intense the longer one waits with the operation. On the other hand, the application of radium in the cervical canal renders the patient temporarily unfitted for operation. It is surprising how many patients will die from septic peritonitis if operated on too soon after radiation treatment. To avoid septic infection and to obviate operation during the stage of fibrosis, the operation may safely be performed within ten to twenty days.

Dr. Albert Soiland, Los Angeles, California: Dr. Schmitz has so thoroughly covered the excellent paper of Dr. Bowing that I wish only to express a thought about the question of operability. As I understand operability it means "curative," and if curative, it is curative by radiation as well as by surgery. I noticed in Dr. Bowing's first group of cases it was stated that at the time of operation no carcinoma was found. I wonder if those patients would not have remained well if there had been no operation? We can go back now five years in our work in cases of unquestioned carcinoma of the cervix and we have perhaps a little higher rate of recovery than follows the same group after surgery. I think we have practically 10 per cent of cures in a group of cases of carcinoma of the cervix uteri that go back five years.

I wonder if Dr. Bowing has the opportunity in his clinic of using the radium alone in these cases, without surgery. If so, I am sure that with his excellent technique he would have just as good results and get along just as well as with the operation.

Dr. Henry J. Ullmann, Santa Barbara, California: In the discussion the question of stimulation was mentioned. To quote Dr. Ewing again, he probably has as much opportunity to see specimens as anyone and he makes the statement that he has never seen anything that could be classed as stimulation. He has seen edema, but not stimulation. Dr. Ward spoke of stimulating the breast cancer along the line of overlapping. Is it not possible that, instead of stimulation, the parts under the screen received so little radiation that the parts between did not receive even an inhibiting dose but

one which permitted them to grow? Russ, in his work on rats, found that it was necessary to reduce the amount to a low percentage of the lethal tumor dose to stimulate the tumors and that a low percentage was the dose he used over the whole (the tumor being protected) rat to produce a condition unfavorable to the growth of tumor. That brings to mind the thought that it might be possible to explain on that ground the fact that we do not get apparent stimulation in the parametrium where radium is used in the cervix and where we get better results than with X-ray. Is it not possible that the radium gives a bodily reaction at a distance from the tumor and a reaction unfavorable to the tumor itself, while the X-ray gives this unfavorable reaction not only to the tumor but to the body as a whole?

Dr. Frank S. Bourns, Seattle, Washington: Just one of the problems that those of us who live in the far Northwest have to deal with—we cannot convince the surgeons that radium alone will cure carcinoma of the cervix in any stage. We have had surgeons passing through our region talking of surgery and surgery only in the treatment of carcinoma. Some of them have not even mentioned radium or referred to the X-ray in any way. It has given me much pleasure to hear this paper this morning, as well as the scientific discussion, because of the added weight that will be given our advice in regard to the treatment of these conditions. If we could have more papers of this character it would help us in no small degree to convince our surgical friends that they should have their patients take this pre-operative treatment. Unless we have propaganda of this kind we are never going to have an opportunity to try what the radium and X-ray can do in pre-operative treatment. I envy Dr. Bowing his opportunity in this line. I am sure this must be true of many others who are far removed from medical centers. I hope Dr. Soiland is right and that we will get to the point where we will be able to prove that this treatment will give as good results as surgery, but certainly very few in our part of the country believe it as yet.

Dr. H. H. Bowing, Rochester, Minnesota (closing): I am certainly very grateful for the liberal discussion on the few remarks I made.

This is a very small group for study and conclusions, although we do have a very good index to assist us in our judgment when we consider the amount of improvement possible in the treatment of advanced carcinoma of the cervix with radium. We all have observed the astonishing results in this hopeless group.

As to the remarks concerning stimulation of the carcinoma with radium, I do not believe there is sufficient data available to prove or disprove the possibility; although the ranges of radium and X-ray have never proven in the laboratory to be of a stimulating character. The cases in which this has usually been considered possible were in the advanced group in which the metastatic process was known to be present, so it is difficult to distinguish any increased activity due to the natural progress of the tumor or from the external influences which may be attributed to the irradiation therapy. If it is possible it is no doubt of a very fleeting character and probably has its analogy in the stimulation observed in the patient during the first few hours following the onset of pneumonia, in which he becomes irrational and may jump out of a window, although in a few hours an overwhelming toxemia occurs. So, too, with these destructive rays. It is very possible that some stimulation may occur, but in a short

time we have the overwhelmingly destructive effects of these short wave lengths.

Concerning the X-ray treatment, these were not considered as a measure since we were of the opinion that the disease was a local one although as a post-operative measure all patients were admonished to take advantage of the therapy. The higher voltage equipment will furnish a more efficient method of dealing a depth dose to the affected parts.

Concerning a specimen removed and the pathological report, the specimen should be a liberal one and representative of the parts. It is very simple to remove a specimen from the medullary type of tumor; the scirrhous type is usually more tedious. It is my policy to remove specimens at the same time the radium is put into position. If this is not possible, it should be removed with the cautery. It has been proven in some instances that a second specimen was necessary before the pathologist could furnish a diagnosis of carcinoma.

Regarding the hysterectomy, I am confident that this is the best possible procedure in the early carcinoma of the cervix uteri following the pre-operative course of radium. In two cases in this group carcinoma of the ovary was also encountered and it is possible that the cervical carcinoma was a secondary one. The operation permitted us to deal most effectively with the pelvic pathology, and I am confident has added greatly to the end-result in these two cases. I feel sure that radium will not benefit the inoperable group to such an extent that they will become operable. The interval between the first application and the date of operation may vary in different patients, although it seems most likely from this study that the best possible time for surgical intervention is from four to six weeks. In other words, the part should be thoroughly healed; this will greatly lessen the chance of dissemination and also reduce to a minimum the chance of peritonitis resulting from an operation in an infected area. One of the surgeons operating on this group volunteered the information that there were no special difficulties encountered and that there was very little tissue oozing. He mentioned that he did not use a smaller number of hemostats, although there was less tissue oozing. The fascia planes separated very easily. Judging from our experience in the treatment of carcinoma, this should be expected, since the destructive effect on the smaller blood vessels and capillaries is one of the first results to be obtained. This would account for his favorable remarks. The quantity of radium rays sufficient to promote healing in a carcinomatous area will also bring about a fibrotic change in the tissue; therefore, we should time our treatment so carefully that we will not cause an over-production of this fibrous tissue and in this way defeat the initial purpose of the treatment. I am confident that radium as a pre-operative measure in a carefully selected group will furnish our best means available at this time to combat the disease and should favorably influence the statistics in this group of patients.

SYMPTOMATOLOGY AND RADIOLOGICAL FINDINGS IN CHRONIC APPENDICITIS[1]

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THE manifold symptoms of a chronic infection of the appendix and their probable cause have been discussed in a number of papers. The radiological findings in this condition have also been elaborated upon until we are prone to lay almost any obscure, abnormal condition that we find in the body to that, shall we say, much abused organ.

Our purpose in this paper is not to add to the already great list of symptoms, sequelæ, or radiological pictures, but to correlate the symptoms with those pictures which we see and which so often explain the varied symptoms that are so prone to confuse the clinician in his examination. We hope this correlation will in some way help to a better understanding and more correct diagnosis of the condition.

The question has been raised by a number of observers as to the existence of the condition as a clinical entity that could produce the symptom complex that we shall accept as that of chronic appendicitis. Our acceptance of this symptom complex as indicating and being the result of a chronic inflammation, is based upon the observations of John B. Deaver (1), E. H. Skinner (2), L. E. Ellis (3), John L. Kantor (4), the work of Keith on the neuromuscular mechanism of the gastro-intestinal tract, along with our own observations in conjunction with our associates at the Post Graduate Hospital on the post-operative alleviation of the conditions, both radiological and symptomatic.

That the appendix is affected in some way or other in a large percentage of patients is shown in the report of John B. Deaver, who reports the pathological findings in 500 cases in which the appendix was removed as an incidental procedure during the course of a laparotomy for other conditions. He reports that 63.4 per cent showed catarrhal or interstitial changes and 14.2 per cent were obliterated.

Again, J. T. Williams and R. Slatter (5), in the Gynecological Service of Boston City Hospital, report the finding of 167 cases of appendiceal pathology during the course of 500 pelvic operations, of which 64 were complications of infective processes in the pelvis, and 103 were undiagnosed, this in a clinic where all cases which might be suspected of appendiceal pathology had been weeded out in the medical and surgical clinics, hence were not diagnosed. Their conclusions were:

1. About one-third of all women operated upon for various pelvic conditions showed undiagnosed lesions of the appendix.

2. In some cases these lesions are results of extension of infection from the pelvis, but one-fifth are not such extensions.

3. Lesions are chronic and of the following types:

(a) Adhesions without changes in muscular or mucous coat,

(b) Chronic inflammatory changes in muscular or mucous coat,

(c) Jackson's membrane.

4. The frequency of these lesions is of importance in its relation to two

[1]Read before the Radiological Society of North America, San Francisco, June, 1923.

questions: First, are such undiagnosed lesions of the appendix the undiscovered cause of reflex symptoms elsewhere? Second, is there such a clinical entity as chronic appendicitis or are the symptoms usually ascribed to it due to some other lesion?

Fig. 1, Case 1. Stomach dilated, atonic, prolapsed. Cap not filling except under pressure.

As a partial answer to the above question, we find a report by C. L. Gibson (6) on the results following operation for chronic appendicitis in which careful search was made for other abdominal lesions at the time of operation. The report included over 300 cases, and he found 85 per cent of appendices removed showed pathological changes, 88 per cent of men showed distinct improvement and alleviation of symptoms, 72 per cent of women showed the same results.

The list of symptoms that have been attributed to chronic appendicitis covers nearly the entire category of human complaints. Probably the best classification of these symptoms is found in "Appendicitis," by John B. Deaver, published in 1913. Of this classification, we have selected only those symptoms which may have some explanation or corollary in the radiological findings. Any one or combination of the following symptoms may be found in a given case:

1. Tenderness in right lower quadrant, no pain; this may be constant or recurrent.

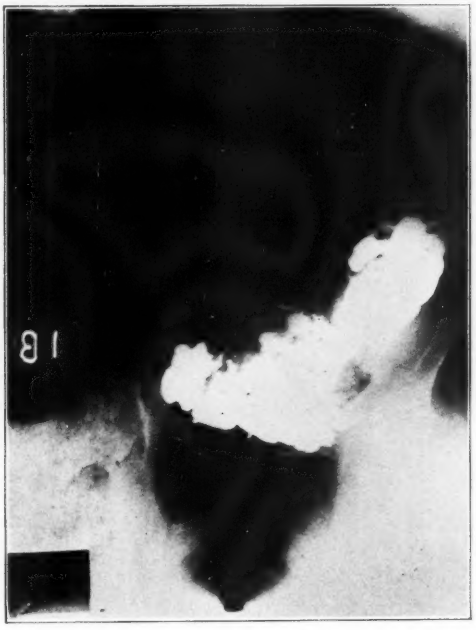

Fig. 2, Case 1. Six-hour plate. Definite stasis in terminal ileum.

2. Constant or intermittent pain; location of this pain may vary greatly, with variation in position of the appendix and with the reflex conditions that so often accompany chronic appendicitis.

3. Pain and tenderness in other portions of abdomen referable to other parts of the gastro-intestinal tract, such as tenderness over gall bladder, duodenum, stomach, transverse and descending colon; pain may even extend to back, as in disease of the urinary tract.

4. Intestinal flatulence, often accompanied by chronic or acute attacks of constipation.

5. Hyperacidity, retention, vomiting, even hemetamesis in rare cases may be present.

6. Loss of weight, malaise and anorexia.

One more symptom might be added from our own observation, that is, a fullness felt behind the sternum, with slight pain at times when swallowing.

If we turn now to the radiological findings in chronic appendicitis, we find a very definite correlation between these symptoms and the variations from the normal found by means of the X-ray.

First, those findings due to reflex spasm or stimulation of the control mechanism of the sphincters and circular muscle fibers throughout the gastro-intestinal tract. Keith puts forth the theory that the spasticity is the result of a stimulation of a specialized neuromuscular type of tissue, which is to be found in the areas so prone to spasticity. Following some work on the neuromuscular mechanism of the heart, in which he claims he found a node that seemed to control cardiac movements, he began a search for a type of tissue that might be doing a similar work for the complicated mechanism around the cecal region. He found a tissue much resembling Auerbach's plexus in the terminal ileum and in the descending colon. He believes that this tissue keeps the bowel in normal tonic state, but that under irritation or stimulation, it becomes hypertonic and a spasticity is produced. From our own observations, it would seem that the same mechanism is in operation at other points in the gastro-intestinal tract, especially in the cardiac end of the esophagus, stomach, pylorus, and first portion of duodenum.

In about 50 per cent of all cases showing appendiceal pathology we find a tendency to cardiospasm, that is, a delay of the first few swallows of the meal at the cardiac end of the esophagus for from 30 seconds to 4 or 5 minutes. When swallowing rapidly,

Fig. 3, Case 1. Twenty-four-hour plate. A visible, irregularly filled, fixed, tender appendix, with hypermotility and spasticity of colon.

this will not be noticed. Of this 50 per cent, 70 per cent complain of slight difficulty in deglutition, slight pain at times following deglutition, or a feeling of fullness behind the sternum. This symptom and fluoroscopic finding has been very rare in our series of cases in which some pathology was not found either in the appendix or stomach. This finding does not conflict with the report on 301 cases of cardiospasm at the Mayo Clinic, by Plummer and Vinson (7), in which they conclude that true cardiospasm in a majority of cases is a definite entity and not secondary to other lesions, because this is not a true spasm, but more of a spasticity, which relaxes upon rapid deglutition. In our opinion,

this is only a reflex spasticity similar to that which occurs in other portions of the gastro-intestinal tract as a result of remote irritation.

In cases where the patient complains of flatulence, eructations, discomfort following meal, with little or no pain,

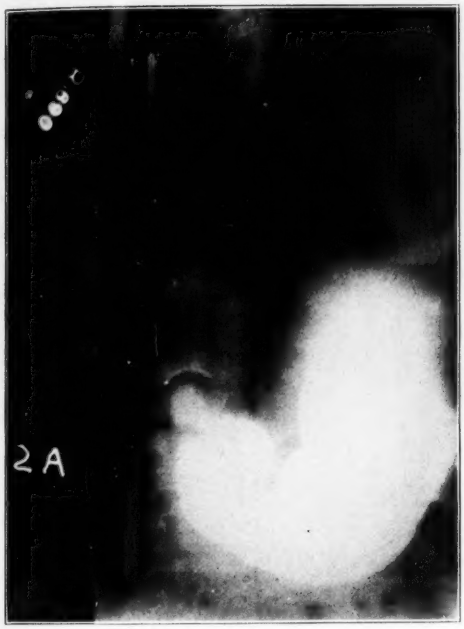

Fig. 4, Case 2. Stomach normal, cap spastic.

we have found a rather constant picture. The stomach is atonic, generally prolapsed, peristalsis decreased, duodenum spastic, with slow emptying of the stomach and a trace of gastric residue at the end of six hours. The rest of the picture is that of a chronic appendicitis, with stasis in the terminal ileum, a visible, irregularly filled, fixed appendix, which may or may not be slightly tender, and which is still filled at the end of 48, or even 72 hours. These findings are generally accompanied by a small amount of spasticity in the descending colon, with some stasis throughout the colon.

Another phase of the symptom complex gives a fairly constant radiological picture. Not a few of our patients complain of anorexia, loss of weight, malaise, combined with some of the other symptoms of chronic appendicitis. When these are the chief complaints,

Fig. 5, Case 2. Six-hour plate. Forty per cent gastric residue.

we find, on radiological examination, that the most prominent findings are, atony of stomach with stasis, spasm of the ileocecal valve, spasticity of the descending colon, causing distinct delay in the progress of the meal, this delay being so marked that portions of the barium meal may be found in the colon at the end of 72 hours. Barium enemata in these cases, when given under slight pressure, disclose no filling defect that might be caused by adhesions, tuberculosis, syphilis, or carcinoma of the colon.

A symptom is sometimes present in the above, which may overshadow the loss of weight, malaise and anorexia, that is, a generalized pain and tender-

ness over the entire abdomen, with alternating diarrhea and constipation. These are very often the symptoms of mucous colitis, which is thought by many writers to be a sequela of a chronic appendicitis. Here the picture is quite constant. A pathological appendix is usually demonstrable. The whole, or any portion or portions of the colon will appear spastic and irregularly filled. The shadow of the barium in that portion which is filled is irregular and stringy, due to the presence of masses of mucus.

Fig. 6, Case 2. Twenty-four-hour plate. Irregularly filled, fixed, tender appendix.

Fig. 7, Case 3. Stomach with spasm of pylorus and duodenal bulb.

A few patients will be found who present a rather typical history of chronic appendicitis, except for the location of the pain and tenderness. Here the clinician may be considerably confused. The location of the pain is sometimes well up in the right hypochondrium, in which case, disease of the gall bladder, duodenal ulcer, renal pathology, and malignancy must be excluded. The symptoms often very closely simulate any one of the above conditions. Many of these cases will present an abnormally high position of the appendix, either with an abnormally high cecum, or a very long appendix, the tip of which is turned up toward the hepatic flexure, in which position it is fixed. The tenderness in these cases is found directly over the abnormally placed organ.

More often, patients complain of pain and tenderness well down in the pelvis; this type is usually found in the female. Diseases of the pelvic organs in these cases must be excluded. It is not always possible because, as reported by Williams and Slatter of the Boston City Hospital, chronic appendicitis is very often a complication of an infective process in the pelvis. However, whether complicated or not, the cases that we have had, showed either a prolapsed cecum and appendix, more or less

fixed to the pelvic organs, or an abnormally long appendix, which extended into the pelvis, where it was fixed by adhesions, a few containing fecaliths and all showing marked delay in emptying.

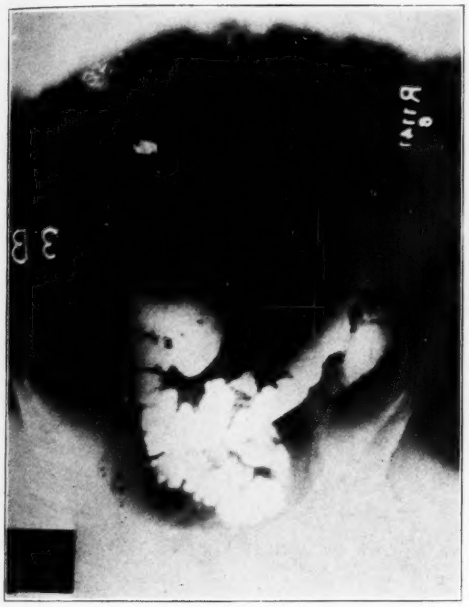

Fig. 8, Case 3. Six-hour plate. Stasis in terminal ileum.

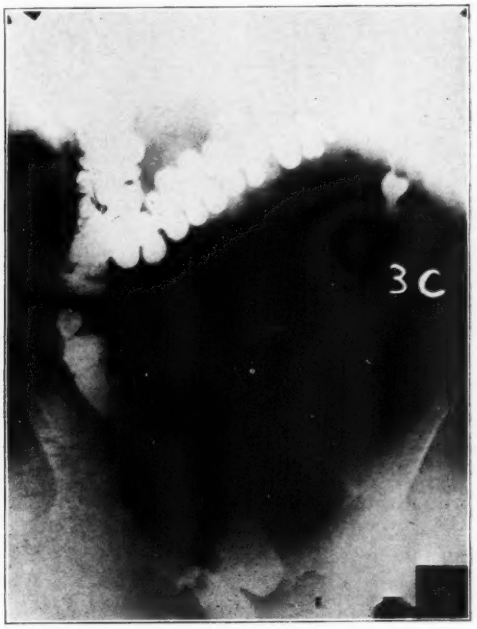

Fig. 9, Case 3. Twenty-four-hour plate. Irregularly filled, fixed, tender, kinked appendix and slight spasticity of descending colon.

CASE REPORTS

The following histories are illustrative of the cases studied. No negative findings, and only those symptoms which have a direct bearing upon this paper will be given.

Case No. 1. Mr. J. C., age 33.

Chief complaint: A dull heavy sensation in the epigastrium, most marked after eating, frequent eructations and flatulence.

History: For past six months patient has had a dull heavy sensation in epigastrium, most marked after eating, accompanied by frequent eructations and flatulence. For past few weeks has had slight vertigo at times. There has been no nausea or vomiting but a marked anorexia, with slight loss of weight. No other history of any importance except that about one year ago had an attack of indigestion with severe pain in right side. This lasted about two days.

Radiological findings: Stomach, slightly prolapsed, dilated, atonic, no adhesions, tenderness, incisura, or filling defects. Cap only fills under manipulation, with no filling defects, adhesions, or tenderness. The six-hour examination showed no gastric residue and stasis in terminal ileum. At the twenty-four-hour examination the appendix was seen irregularly filled, fixed, kinked, and tender. Cecum also fixed and tender, with meal advanced to splenic flexure. At forty-eight-hour examination, appendix still seen irregularly filled, fixed, and tender, after complete emptying of cecum.

Diagnosis: Chronic appendicitis.

At operation, a slightly congested appendix was found, with adhesions fixing it to the terminal ileum. No other pathology was found in the abdomen.

Result: Complete alleviation of symptoms.

Case No. 2. Mrs. A. K., age 38.

Chief complaint: Intermittent pain in right side of abdomen radiating to epigastrium. Is constipated.

History: For past four months, patient has had intermittent attacks of pain in the right lower quadrant of abdomen, radiating to right hypochondrium and epigastrium. The pain is most severe about one hour after eating,

Fig. 10, Case 3. Forty-eight-hour plate. Stasis in appendix, cecum, and colon.

radiating to epigastrium, right hypochondrium and beneath right scapula. There has been no nausea or vomiting. Pain has never been so severe that patient had to stay in bed.

Genito-urinary history, negative.

Radiological findings: Stomach normal in size, shape, and position, no incisura or filling defects, no adhesions or tenderness, decreased peristalsis. Spastic duodenal bulb, which filled under pressure with no adhesions or permanent filling defects. At six-hour examination, a 40 per cent gastric residue was found. The twenty-four-hour examination showed an irregularly filled, fixed, tender appendix, with some tenderness of cecum.

Diagnosis: Chronic appendicitis.

At operation, a chronic appendicitis was found, with no other pathology in the abdomen.

Result: Complete alleviation of symptoms.

Case No. 3. Miss E. S., age 24.

Chief complaint: Pain and tenderness in epigastrium, occasional nausea and vomiting, severe constipation.

History: Has had attacks of pain and tenderness in epigastrium for past five months. Attacks come on suddenly without relation to

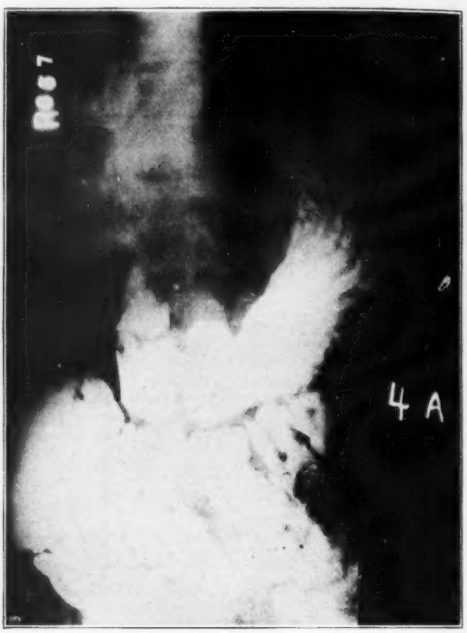

Fig. 11, Case 4. Stomach. Hypermotility with small niches near pylorus which were not constant. Spasticity of pylorus and cap, with tenderness over this area.

eating. Occasionally nausea and vomiting accompany attacks. Pain during attack is not constant. Tenderness lasts for several days after attacks. Has had some pain in right iliac fossa extending into pelvis, followed by tenderness in iliac fossa for eight to ten days following attack. Attacks are irregular, occurring from one to three weeks apart. One month ago became suddenly severely constipated.

Radiological findings: Stomach normal except for slight hypermotility, spasm of pylorus with slight tenderness over pylorus. Duodenal bulb normal except for slight spasticity and tenderness. Six-hour examination showed no gastric residue but marked stasis in terminal ileum. Twenty-four-hour examination showed typical chronic appendicitis findings with spasticity of the descending colon. Forty-eight-hour examination showed stasis in the colon with stasis in the cecum and appendix.

Diagnosis: Chronic appendicitis.

At operation, chronic appendicitis with no other pathology found in the abdomen.

Result: Complete alleviation of symptoms.

Fig. 12, Case 4. Six-hour plate. Hypermotility, meal having advanced to sigmoid.

Fig. 13, Case 4. Twenty-four-hour plate. Irregularly filled, fixed, kinked, tender appendix, with some spasticity of colon.

Case No. 4. Mr. M. R., age 30.

Chief complaint: Pain in epigastrium with burning sensation shortly after eating. Attacks of indigestion, diarrhea and constipation.

History: First noticed burning sensation in stomach about one year ago. Pain developed in epigastrium some time after that. No nausea or vomiting but complains of regurgitation of sour liquid after eating. Alkalies relieve symptoms. Complained of slight attack of pain and tenderness in right iliac fossa about five months ago. Did not stop work during attack. Complains of alternating attacks of diarrhea and constipation since attack of pain in right iliac fossa. The diarrhea lasted for two to four days, with no blood but some mucus in stool.

Radiological findings: Stomach normal except for hyperperistalsis, small spastic niches near pylorus, which are not constant, spasm and tenderness near pylorus. Duodenal bulb spastic and tender, otherwise normal. No gastric residue at six-hour examination but distinct hypermotility of the meal was found, the ileum being empty and colon filled from cecum to rectum. The twenty-four-hour examination showed the typical findings of chronic appendicitis with hypermotility of colon.

Diagnosis: Chronic appendicitis.

At operation, diagnosis confirmed, with no other pathology found in the abdomen.

Result: Complete alleviation of symptoms.

SUMMARY

The preceding discussion and series of cases point out quite a definite relation between the symptoms complained of and the abnormalities found by radiological examination. This relation is so constant that with a certain symptom we would expect to find a certain abnormality upon examination, in at least 90 per cent of the cases. We have found the relations of the

symptoms to radiological findings in chronic appendicitis as follows:

With difficulty in swallowing, slight pain or fullness behind sternum, we find a tendency to cardiospasm.

With regurgitation, vomiting, eructation, we find spasticity of cap, atony, and stasis in stomach.

With loss of appetite and weight, malaise, we find stasis, colitis, and spasm of ileocecal valve.

With hyperacidity, pain in epigastrium, tenderness in epigastrium, which may or may not radiate to right side of back, we find hyperperistalsis, marked pylorospasm, and spasm of duodenal bulb.

With pain, localized tenderness on the right side below or above the normal location for an appendix, we find an abnormally low or high appendix.

With general tenderness over abdomen, we will generally find an extensive colitis.

Each of the above accompany the findings of a visible, irregularly filled, fixed, tender appendix.

CONCLUSIONS

1. There is a definite relation between the symptoms and the radiological findings found in chronic appendicitis.

2. That the symptoms are in part, at least, the result of reflex spasm, which is evident on radiological examination.

3. That unusual location of pain in chronic appendicitis may be accounted for by the location of reflex spasm or abnormally placed appendices, the spasm or abnormal position being located by means of radiological examination.

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ABSTRACT OF CURRENT LITERATURE

Schlagintweit and Sielmann: Roentgenintoxication (Untersuchungen ueber den "Roentgenkater"). *Klin. Wchnschr.,* 1922, i, 2136.

These authors investigate the action of physiological salt solution as recommended by Voltz in acute roentgen intoxication or sickness. They have found that in several cases of severe disturbances following the application of large doses there was a dilution in the blood manifested by a decrease in the relative amount of erythrocytes and a decrease in the chloride content of the blood. Sodium chloride administered in any form gave full relief to these patients. The authors found that the most expeditious method was to give 1 cc. of a 5 per cent solution by intravenous injection. However, the ingestion of 5 or 10 grams by the mouth also had a favorable effect.

PROTECTION AGAINST RADIATION

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THE increasing usefulness of roentgen rays in the diagnosis and treatment of various disease conditions is causing many institutions and physicians to add such facilities to their equipment. Owing to the more limited usefulness of radium and also to the cost, its distribution is not likely to become so widespread as that of roentgen rays. That these substances are not harmless agents is not sufficiently impressed on us until we read of the death from prolonged exposure to radium of three members of the staff of the Radium Institute of London, or the letter of a Chicago gynecologist who reports having encountered several cases of sterility caused by handling radium. This does not take into account the many cases of acute and chronic skin changes in patients and radiologists that are attributable to a single overdose, or to the cumulative effects of repeated exposures for long periods. Instances of accidental roentgen-ray and radium burns continue to occur. As regards diagnostic roentgenology, such accidents usually happen in the hands of the inexperienced. In roentgen-ray and radium therapy, on the other hand, radiodermatitis is not so commonly "accidental." In treating certain lesions, particularly the resistant types of malignancy, it is often necessary to give the maximal dose permissible, and, since the skin varies somewhat in sensitiveness, there is more or less marked local reaction in certain cases. There is also the possibility of technical errors, and it may be said that when severe forms of radiodermatitis are encountered, they are commonly the result of such errors.

GENERAL EFFECTS OF RADIATION

On the skin.—The skin of different persons reacts more or less actively to a full dose of roentgen rays, and such variation seems to depend very largely on the amount of natural pigment in the skin. In general, blondes are distinctly more susceptible than brunettes. The degree of such variation may reach 10 or 15 per cent. True idiosyncrasy is practically unknown.

On the genital organs.—Soon after Roentgen's discovery of the rays, experimental studies carried on in Germany and in France disclosed the fact that the male and female genital glands are especially susceptible to their action, and that prolonged or frequently repeated exposure results finally in total sterility.

On the blood.—The action of roentgen and radium rays on the blood is well known. The changes thus far demonstrated have concerned only the cellular elements. For instance, every radiologist knows that the lymphocytes are particularly radiosensitive and that reduction in their number follows even moderate doses of roentgen rays, or of radium. Such destruction is proportional to the dosage and, when it follows a single course of treatment, regeneration takes place in a relatively short time. This lymphocytic destruction varies considerably in different individuals; Russ demonstrated some years ago that the rate of regeneration after exposure is a more accurate index of its effect than the primary reduction.

The action on the lymphocytes is the first observable effect of prolonged exposure to any source of radiation;

therefore, to the radiologist or to his assistants, it may constitute a danger signal. The lymphocytic reduction is often associated with an increase in the percentage of polymorphonuclear leukocytes, and this leukocytosis, whether relative or compensatory, is commonly accompanied by a reduction in hemoglobin.

POSSIBLE DANGER TO THE PATIENT

The potential danger from roentgen rays varies according as they are employed for diagnosis (roentgenography and roentgenoscopy), or for treatment (roentgenotherapy), not primarily because of any essential difference in the nature of the rays themselves, but because of the different conditions under which diagnosis and treatment are carried out.

When used for diagnostic purposes the roentgen rays must be relatively soft, of low penetration, or of long wave-length (these are synonymous expressions). Such rays are generated at transformer voltages of from 40,000 to 60,000. The rays from a tube operating at such voltages are in large measure absorbed in the superficial tissue layers, and a relatively short exposure will produce irritation, or more serious effects in the skin. Trained roentgenologists are familiar with the permissible range of exposure in examining various parts of the body. This latitude of exposure at a given voltage or spark-gap varies with the amount of current (milliamperes), and with the distance between the tube focal spot and the patient's skin.

In roentgenoscopy the same range of voltage is employed, but with a much smaller amount of current (this usually varies between 3 and 6 or 7 milliamperes). The allowable range of exposure is, therefore, much greater than in the case of roentgenography, in which the current employed varies from 20 to 100 milliamperes.

Roentgenography. — In roentgenography the only possible danger to the patient (aside from electrical shock, which I am not considering) is from over-exposure, which seldom occurs in experienced hands, and then is usually the result of making too many plates of the same part in a given period of time.

The only way of avoiding such accidents is through the adoption of, and strict adherence to, a well-planned technique. The preparation and constant use of a maximal exposure chart, giving the number of plates which may be made at one time under given conditions is a valuable precaution.

Roentgenoscopy.—In roentgenoscopy, the danger, so far as the patient is concerned, lies largely in unconscious over-exposure. The roentgenologist, interested in some unusual finding, anxious to make a diagnosis in a difficult case, or wishing to observe the behavior of certain physiologic or pathologic phenomena, may lose sight of the total exposure, particularly if, after the roentgenoscopic examination, the same region is further exposed for serial roentgenograms. It is a simple matter to calculate the total permissible exposure under given working conditions, and the roentgenologist must train himself to keep within safe limits.

Roentgenotherapy.—So far as the patient is concerned the possibility of ill effects concerns, chiefly, the skin, the blood and blood-forming organs, and the general condition.

Skin.—As I have mentioned, certain types of malignancy require the strongest permissible dose, and since the skin of different persons varies somewhat in sensitiveness, it is impossible always to avoid a moderate degree of reaction. It is wise to explain this to the patient beforehand and to add to the explanation a prescription for Dodd's lotion; this will prevent many cases of radiodermatitis.

Severe radiodermatitis, involving the entire cutaneous layer and sometimes the subcutaneous layer, is usually the result of gross error in technique. Careful attention to all the details connected with treatment, and close supervision of its actual administration should entirely prevent such unfortunate sequelæ.

Blood.—If the state of the blood in a given case has already suffered as a result of the disease afflicting the patient, this should be known to the radiologist and be given due consideration in deciding the question and details of treatment. There is no doubt that indiscriminate exposure of a patient to roentgen rays is undesirable. Regions that are not to be treated should be carefully protected from direct radiation.

Systemic reaction.—The systemic reaction which commonly follows the treatment of patients with the more penetrating roentgen rays may sometimes assume serious proportions. However, this can occur only in patients already weakened by a debilitating disorder, or as the result of too much treatment in a short time. Here the only safeguard is clinical judgment based on experience, and careful repeated examination of the patient. We all know of cases in which death has been hastened by too intensive treatment. This is particularly true in connection with high voltage treatment, to which many patients have been subjected when their general condition was already so poor that they had no strength left to react. Such fatalities can be avoided only by careful selection of patients. Cachexia, marked loss of weight and strength and unexplained fever should constitute contraindications to high voltage treatment.

POSSIBLE DANGERS TO THE RADIOLOGIST

Roentgenography.—The danger to the roentgenologist in this phase of his work lies in the possible effects on the cellular elements of the blood and genital glands. In the average modern laboratory, the possibility of ill effects is relatively slight, and can readily be avoided if he keeps between himself and the tube, a protective lead screen, or preferably a lead-lined booth.

Roentgenoscopy.—It is in the field of roentgenoscopy that the roentgenologist is exposed to the greatest danger, and it is from this source that have come nearly all the reported cases of so-called roentgen-ray cancer. The danger lies in the frequent exposure to doses of roentgen rays which, individually, may be small, but which collectively are sufficient to constitute an overdose, and in time produce a chronic dermatitis. The rays in this case act as a chronic irritant and, if such irritation be continued, it may, especially in a predisposed individual, lead to epitheliomatous proliferation. This has occurred to well-known roentgenologists who, in the early days of this branch of medicine, did not realize the danger, and were not provided with all the technical improvements in apparatus, and means of protection which are now employed. The one lesson we must learn from our unfortunate predecessors is that no roentgenologist can afford to be careless, and that, if he wishes to avoid a similar fate, he must take advantage of the means available to prevent such accidents, and make intelligent use of them.

In roentgenoscopy there is comparatively little danger of systemic (blood) disturbance (unless roentgenoscopy should constitute an important part of one's work), because the dosage reaching the cellular elements of the blood is relatively small. Such cellular blood changes as may develop are more likely, in the average case at least, to be due to confinement in the necessarily dark and commonly ill-ventilated spaces used for such work. It is common for

a roentgenologist, who has become concerned over a somewhat reduced blood count, to discover, on arranging his work so as to give himself an opportunity to spend more time out of doors, that the cellular reduction was merely the result of confinement. There is a tendency to explain all blood changes occurring in persons exposed to roentgen rays as necessarily due to the action of such rays. Certain statistical studies have been published and conclusions drawn in which this tendency has led to the overshadowing of the actual facts.

Hematologists are well aware of the considerable variations in counting the corpuscular elements of the blood of persons considered normal. In my own laboratory, bimonthly blood counts of the personnel are made, and the variations are surprising. Certain persons who considered themselves well, had a leukocyte count as low as 4,800 when they entered the service. Only a persistently low, or steadily declining blood count need give concern, and in such an event action must be taken in two directions; the person concerned must change his occupation for one more favorable, or he must take a prolonged vacation, after which the conditions surrounding his work must be carefully studied and such factors removed as may have been responsible.

The work of examining patients roentgenoscopically should be concentrated within the shortest possible period of time, and the technique adopted in different types of cases should take into consideration the factor of minimal exposure consistent with the work in hand. An apron of tested lead rubber should be worn to limit the roentgen-ray absorption in the vital regions of the body, and long lead rubber gloves to reduce to the lowest possible degree the absorption of the rays by the skin. In some cases it may be advisable, or necessary, to remove the gloves for careful palpation or delicate manipulation, but the more this can be avoided, the better.

The fluorescent screen should itself be covered by lead glass to diminish exposure of the skin of the face, which, with the hands, are the two most exposed parts.

The question of ventilation is of much more importance than one would surmise on inspecting many rooms used for roentgenoscopy. It is almost incomprehensible how many roentgenologists are content to work, sometimes for considerable periods, in a tightly closed room with no provision whatever for changing the air, except what may enter or pass out with the patients. The fact that a room for roentgenoscopy must be light-proof does not mean that it must be air-tight.

In many instances, however, the roentgenologist is not alone to blame. Hospital authorities are often very short-sighted in this direction. Fortunately, of late years, a distinct improvement has become evident, and in an increasing number of hospitals it is realized that it is not right to employ scientific principles in treating patients, and to ignore those principles where their employees are concerned. This applies with special force to the roentgenologist whose occupation, one may say, involves certain "natural hazards."

Roentgenotherapy.—The danger to the radiologist and his assistants in roentgenotherapy concerns largely, if not entirely, the blood and blood-forming organs, and the genital glands. Such danger, though real, is exaggerated in some instances, while in others it is not given the attention it deserves

The effect of roentgen rays on the blood of the operator depends entirely on the quantity or dosage reaching the tissues, and it cannot be questioned that, in roentgen therapy, owing to the higher voltages employed, the radiologic

personnel is more exposed than in purely diagnostic work. Except in extreme cases, the ill effects of radiation do not become evident for months or years. Nevertheless, the possibility of danger from this source should not be lightly dismissed. That prolonged exposure to roentgen rays can in time produce sterility must also be borne in mind.

Protection.—The advent of so-called high voltage roentgen-ray treatment brings the question of protection into rather sharp focus, especially since very little definite information is available on what constitutes adequate protection. In certain laboratories the person operating the apparatus stands, or sits, behind a leaded screen, either in the form of a simple shield in the treatment room itself, or of a more or less enclosed cabin or booth. In certain recently installed laboratories for high voltage treatment the aim has been to enclose the tube in a thick lead casing, but this does not do away with the scattered radiation. Should we attach much importance to this fact? In one such laboratory the heavily leaded tube-box had no top and was considered the "last word" until tests with films revealed a tremendous amount of scattered radiation.

How effective are these precautions against radiation? To obtain information on this problem I have been carrying on a simple experiment. My aim was to determine the thickness of lead necessary to protect against radiation at certain voltages, and also whether a simple lead shield was sufficient, or whether the operator must be more or less surrounded with lead. The following may be considered in the nature of a preliminary report.

I had three boxes of lead constructed, ⅛, 3/16, and ¼ inch thick, respectively. On the interior of each side of each box were placed ordinary dental films. These boxes were then placed in a treatment room at a distance of 7 feet from the tube. In the first series the door of each box was kept closed, while in the second series the door was kept half open, but with the opening away from the tube (Fig. 1). This room was used daily from eight in the morning until six at night, with the tube in almost constant operation. The experiments were carried on with the tube operating at 135 peak kilovolts (Fig. 2).

After two and a half days the first film was removed from each box to see if any appreciable effect had been produced, either by direct or by secondary radiation, to serve as a guide for the remainder of the experiment. In Figure 2 the exposed films are not appreciably affected, while the control films are definitely fogged. This is easily accounted for by the fact that in Series A, I used as controls films which had been in the office for at least one year. In Series B and C the controls were fresh films. Figures 3 (14-day series) and 4 (28-day series) show that a closed lead box ⅛ inch thick is sufficient to stop for at least thirty days all radiation emanating from a standard Coolidge tube operating at 135 peak kilovolts.

Figure 4 shows the result obtained in Series A films (14 days) with the doors of the boxes partly open. Slight fogging is present, but it is not pronounced in spite of the fact that these films were attached to the inner face of the door and were for that reason somewhat more exposed than those attached to the inner walls of the box itself.

Figure 5 shows the result in Series B films exposed for thirty days. There is only slight fogging. These tests are admittedly crude, but they at least indicate fairly clearly that, at the voltage mentioned, a five-sided box or booth lined with lead ⅛ inch thick seems to provide a high degree of protection. Whether all five sides are essential has not yet been determined, but these tests will be continued and repeated at 200,-

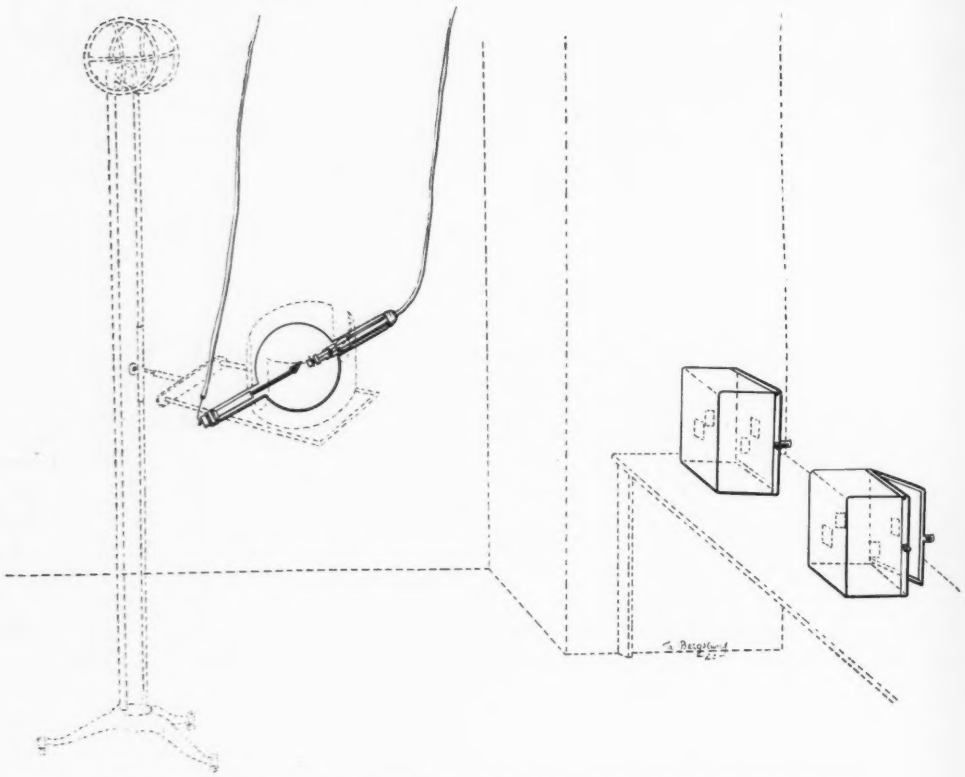


Fig. 1. Position and arrangement of lead boxes with relation to tube.

000 peak volts and will be checked by ionization studies.

If lead ⅛ inch thick affords as much protection as is here indicated at 135 peak kilovolts, it would seem reasonable to conclude that lead 1/16 inch thick would provide effective protection against the much softer rays used for roentgenography and roentgenoscopy. However, it is doubtful if a simple leaded shield standing free in a room constitutes an adequate protective barrier; it is unquestionably preferable to have this shield in the form of a booth with at least five sides lined with lead.

In rooms used for roentgen therapy ventilation is of the utmost importance from the standpoint of the patient and of the personnel. There is no question that the gases given off by the generating apparatus and through corona along the conductors have some bearing on the incidence and severity of radiation sickness.

Working hours should be arranged so as to allow all persons concerned a reasonable opportunity for outdoor activities.

Radium treatment.—The only serious possibility of danger to patients lies in over-exposure, or treatments too often repeated. Radium, because of the greater penetration of a portion of its rays, and because the form in which it is available, brings it into closer relations with the persons concerned in its

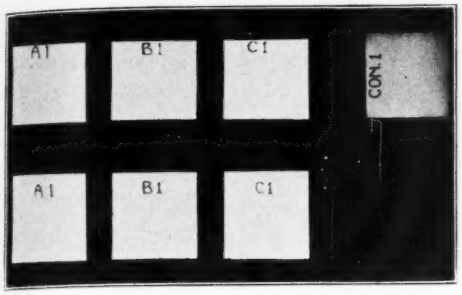


Fig. 2. Film showing result of 2½ days' exposure in closed boxes of lead, ⅛, 3/16, and ¼ in. thick, respectively. Fogging of control films due to use of old films.

administration as a therapeutic agent, is potentially and actually more dangerous than roentgen rays. This potential danger is often not fully realized and for various reasons, minimized.

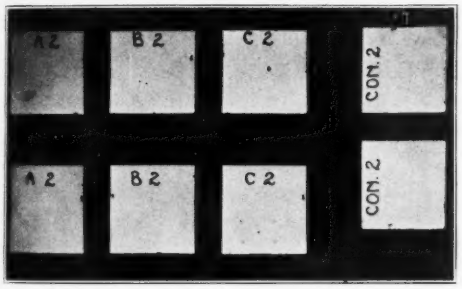


Fig. 3. Results of 14 days' exposure in closed boxes. Comparison with control films shows no fogging.

Skin.—The first noticeable ill effects in persons actually handling radium are local cutaneous changes, beginning in the fingers, with gradual loss of sensory acuity, and followed by drying, and cracking of the skin and nails, which become brittle. Such changes are not observed in persons who do not actually handle radium, but they are common enough in those who have had to make up applicators, or actually to apply the radium to patients for any length of time, unless unusual care has been exercised.

Genital organs.—Next in importance comes the possibility of sterility, which

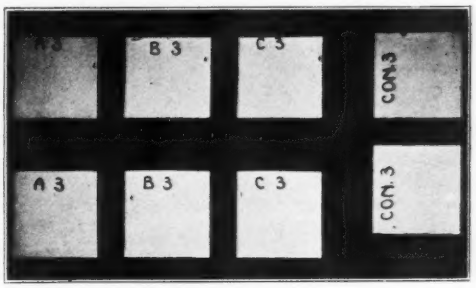


Fig. 4. Results of 28 days' exposure in closed boxes. No evidence of fog as compared with control films.

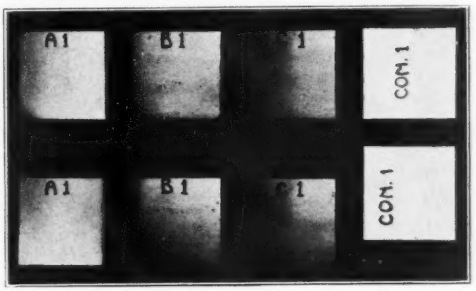


Fig. 5. Results of 14 days' exposure in half open boxes (films on inner face of door). Slight fogging was present.

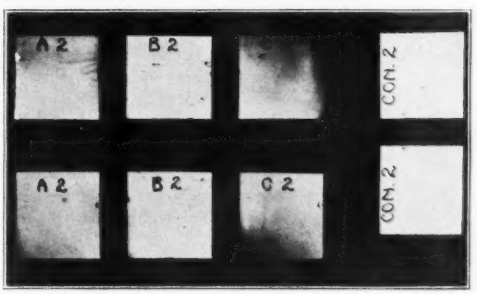


Fig. 6. Results of 28 days' exposure in half open boxes. Slight fogging was present.

may not be discovered for some time. There is no particular functional debility, but the essential life-transmitting elements are no longer produced in the genital glands.

Blood.—Finally, the blood changes resulting from over-exposure to radium resemble in every way those described

for roentgen rays. It should be stated that the effects on the genital glands and on the blood are produced slowly, the time depending, of course, on the degree and frequency of exposure, the quantity of radium involved, and the actual conditions surrounding the work.

In a well-organized and well-administrated laboratory these dangers are relatively slight; but, as the work is carried on in some institutions and laboratories, such changes are inevitable.

Protection.—The entire personnel involved should be thoroughly instructed with regard to the possibility of danger in radium, and great emphasis should be placed on the importance of extreme care in handling it. All capsules, needles, seeds and applicators containing radium should be manipulated with long forceps so as to increase the distance between the radium and the holder. The preparation of applicators should be most carefully studied, and every possible means adopted to diminish the exposure of the person charged with such preparation. All such work should be done with as much of the body as possible protected by a heavy, fixed lead apron coming well up to the neck, and with a horizontal base to protect the lower part of the body. Additional protection for the face can be provided by fixing, at the top of the vertical segment of this apron, a heavy sheet of lead glass.

Persons whose duties bring them into close relation with radium should be carefully supervised and instructed, and should be relieved at stated periods and assigned to less exposed duties. Neglect of precautions on the part of responsible heads has in some instances produced, in innocent persons, ill effects which could have been easily avoided.

The emanation plant is another source of danger of the same nature. The more recent installations have been greatly improved, but some of the earlier plants are lamentably deficient in this respect.

The cultivation of an outdoor hobby is of special importance to all persons exposed to radiation.

ABSTRACT OF CURRENT LITERATURE

Barringer, B. S.: Technique and Statistics in the Treatment of Carcinoma of the Bladder by Radium. *Amer. Jour. of Roentgenol.*, 1922, ix, 757.

The characteristics of 10 operable and 20 inoperable tumors of the bladder treated by Barringer were as follows: Multiple, 8; indurated base, 18; involving ureter, 5; involving trigone, 8; involving bladder neck, 12; lateral wall, 6; vault, 1; grown through bladder, 1.

In 8 of the 10 operable cases and in 20 inoperable cases of the bladder carcinoma, the tumors have been removed by radium. Radium removal is superior to surgical removal because it can cope with inoperable cases. If a suprapubic radium removal is necessary the time of operation is shorter, and the kidneys are less disturbed by the operation. Post-operative or post-radium recurrences can be better dealt with. Many so-called operable tumors can be removed intra-urethrally without any operation.

Barringer says that in the Mayo Clinic 20 per cent of patients operated on for infiltrated carcinoma of the bladder died during the first month after the operation, as compared with no immediate mortality in radium removal.

DETERMINATION OF THE QUALITY OF THE HEART MUSCLE BY FLUOROSCOPY[1]

By HARRY SPIRO, M.D.
Assistant Clinical Professor of Medicine, Stanford Medical School

PHYSIOLOGISTS teach us that there are five qualities of heart muscle, namely:

Excitability,
Impulse Formation,
Conductivity,
Contractility, and
Tonicity.

With the aid of a little imagination we can see these during a fluoroscopic examination.

We can say that the heart is excitable because we see it responding to some stimulus by visibly contracting.

We can say that it has the power of impulse formation because in certain conditions which have proven to be heart block, the auricles contract at a different rate from that of the ventricles. The fact that we can see the ventricles contracting independently shows that it has the power of impulse formation.

We can see conductivity demonstrated in certain cases where the heart is contracting regularly and occasional extra heavy waves are noted, suggesting extra ventricular systoles.

The statement is often made that because of a certain shape, the heart is lacking in tonicity. However, tonicity is a questionable quality. It does not mean heart shape. The shape of the heart is due to its structural characteristic and not to the tone of the muscle. The heart retains a great deal of its characteristic form even after death. It alters its shape when certain parts of its structure are abnormally strained or developed—but its tonicity, if it has any, need not thereby be altered. Tonicity also implies that the heart is not completely relaxed in its diastolic period. Recent experiments by Bainbridge and Starling have shown that the heart is completely relaxed in diastole, and that its enlargement during that period is due to venous pressure. They also suggest that "systolic contraction is a measure of muscle energy or tone"—tone would then imply possible power.

All of the above qualities are intended to facilitate the promotion of the fifth quality—that of contractility. This quality is easy to demonstrate fluoroscopically.

Interference with any one of the above-mentioned qualities would not necessarily diminish the power of contractility, because that is an independent heart quality, but interference with any one quality may alter the general efficiency of the heart so that its power of contractility may become impaired: as contractility is the main function of the heart, a visible lessening in this power would suggest a heart probably lacking in efficiency and so probably composed of poor quality of muscle.

In speaking of poor quality of heart muscle, I mean an inefficient heart in its broadest interpretation. This would include what the clinician means when he speaks of myocarditis, even though a pathologist might not find marked evidence of disease. As myocarditis should be diagnosed only after a microscopical examination, I will continue to use the term "poor quality of muscle."

A heart of good quality of muscle should show thoroughness in contraction and thoroughness in relaxation. Even relaxation appears to be as vigorous as contraction. The healthy heart, therefore, should show fairly

[1]Read before the Radiological Society of North America, San Francisco, June, 1923.

large pulsatory waves, but just as individuals differ in their physique and muscular development, so do their hearts differ in their visible signs of good quality.

With these statements in mind, let us imagine ourselves before a screen and a heart under observation. Starting at the lower end of the pulmonic arch, which arch often shows signs of movement, is an area that has been called the "node of no motion." This node represents the auricular appendage, and to the left of it is a vigorously moving area which is the left ventricular arch. The junction between the left appendage and the left ventricular arch should by this motion be visible. If it is not visible, it is one sign, though a minor one, of poor quality of muscle, because this point is visible only in hearts which are contracting and relaxing thoroughly, and as visible motion means muscle energy or tone, a lack of motion at this point could be due to lack of tone—therefore, poor quality of muscle. (The size—the amplitude—of the waves seen at this point is not important. I have seen waves of very large amplitude, over a centimeter in size, and in other cases small waves, though the heart was apparently healthy.)

Schwartz and Groedel have called attention to the fact that in many pathological hearts a pulsation is seen limited to the horizontal border. I can confirm this, and say that I have not seen pulsatory waves practically limited to this area, except in inefficient hearts, and while it is not possible to state from an X-ray observation what the exact underlying pathological condition is, I will say that I have seen cases in which the only evidence supporting the clinical diagnosis of pathology was an abnormal heart shape and this abnormal area of pulsation, the blood pressure and heart surface area being close to the average. From this part of the ventricular arch, the waves extend towards the apex either in a gentle, wavy manner or often in a vigorous, almost peristaltic, movement. At the apex, if the apex is normal and really formed by the lower end of the left ventricle, the direction of the movement becomes upward and inward towards the spine. At times a movement towards the diaphragm is seen. Naturally, the movements in this region should be greater than in any other part of the heart.

Lack of movement in the apical region is a sign which suggests an abnormal heart. I have noted an absence of movement in this region only in cases that have had symptoms suggesting myocarditis. Frequently, the entire heart seems to move upward and inward without large or distinct marginal waves. I like these hearts, and have seen this action only in hearts in which the muscles were apparently efficient. If the diaphragm can be separated from the lower border of the right ventricle, you frequently can see the latter move, though lack of movement in this region has no significance. At the cardiohepatic junction, as a rule, very little movement is discernible. If there is a vigorous movement at this point in contrast to moderate movement above this spot, it is evidence that the right ventricle is enlarged and can be seen pulsating. Children, normal in all respects, often show vigorous movement at this spot. Their right ventricle may be relatively enlarged.

You generally see a wavy movement, though lacking in vigor and of small amplitude, in the right auricular region. Sometimes you have to look carefully to see auricular movement. Lack of movement in this region does not signify myocardial inefficiency, because the auricles are not called upon and are not built to contract powerfully; violent movement in this region may speak for increased strain on the right auricle.

I have seen violent movement in this region only when some cardiac defect was present, but through lack of post-mortem experience, I am not prepared to say what is the most frequent pathological finding. It apparently is not significant of any particular cardiac defect, as I have seen it in complete heart block and in cases of dilatation of the ascending aorta and in mitral valve disease. I have not seen it in a clinically intact heart. As you would expect, slow-acting hearts in general show fairly large pulsatory waves. I am very suspicious of slow-acting hearts whose waves are small or purely marginal, thus giving one the impression of an incomplete contraction, or, as Von Zwaluenburg expressed it, "unsatisfactory action"—the observer being dissatisfied.

Small hearts pulsate with a great deal more vigor and thoroughness in all their parts than normal sized or slightly large hearts do. I have seen small hearts contracting with such vigor and thoroughness that you would think the patient must be troubled with palpitation, and yet the patient was unconscious of heart action. If, however, a small heart (remember this is according to age, size, and development, things which you cannot see on the film) contracts sluggishly or with a pulsatory wave of limited visibility, I would say that its musculature is not up to the proper standard, and under strain would probably prove inefficient. This statement, if true, would show that even if the heart is apparently normal in shape and in size, it may be composed of poor quality of muscle, which can be judged by fluoroscopy. Visible speed and waves of small amplitude, the wave being indistinct, generally mean fatigue and lack of reserve power, because hearts generally speed up when weak. Exceptions to this are often seen in goiter cases, where, if the rate averages 100, the waves may be fairly large; but even in rapid-acting hearts, if the muscle is good, the waves, though small, seem to be carried out in a determined manner, each wave being clear-cut.

The heart of the female does not contract with as large an amplitude of visible motion as the heart of a male of the same weight, so if you examine a husky male whose heart happens to be on a border-line as to size but whose waves of contraction have as large an amplitude as you would expect in a female, you may then report inefficient heart muscle.

Schwartz has called attention to waves of very large amplitude as being abnormal and seen in valvular lesions. I think if we leave out the question of the heart being abnormal because the waves are large, and take his suggestion that because the waves are large a valvular lesion is probably present, we will come nearer the correct guess. We all agree that in the majority of cases of valvular lesions, the heart muscle is of good quality. If this were not true, these patients would not live long, so if it is a preponderance of good heart muscle that keeps this type of cardiac alive and we see large pulsatory waves in these compensated cases, then we have an argument in favor of the statement that large waves mean good musculature.

In cases of clinically doubtful valvular insufficiency, the absence of large pulsatory waves may swing the diagnosis in favor of no valvular insufficiency. By the same process of reasoning, we could say that if there are definite clinical signs that a valvular lesion is present and the roentgenologist reports a heart muscle of poor quality because he finds waves of small amplitude, this suggestion should make the clinician give a poorer prognosis than he might otherwise have given if he depended upon size and shape alone.

We have considered small hearts, medium hearts and valvular lesions, and

so in conclusion large hearts will be considered. The enlargement may be healthy—a family type—and yet enlargement is one of our most reliable signs of poor quality of heart muscle. The larger the heart, the probabilities are that the poorer is its quality. If to a large sized heart we add very little visible motion, you have evidence that the greatest part of this heart is composed of muscle of poor quality. As was previously stated, visible motion is an index of muscle energy, and therefore of tone. A decrease in visible motion means a decrease in tone, or poor quality of muscle.

This brings up another interesting physiological question, which is that large hearts do not need to contract as much as smaller ones in order to supply the body with its proper quota of blood. This is true. We should remember, however, that a large healthy heart (the enlargement the result of training or muscular development) has a great deal of reserve power. Put strain upon this heart and it "speeds up" until an equilibrium is established. It then may slow down slightly and carry on with a larger and more powerful stroke. You may say that its excess reserve power is due to its power to stretch farther in diastole and to contract in systole with a larger and swifter stroke. It, therefore, shows large pulsatory waves.

Large healthy hearts act slower and empty more thoroughly than large unhealthy ones do, and it is my experience that a large healthy heart with a pulsatory wave of small amplitude is very unusual. I have not seen a large heart with small waves which did not give clinical signs of inefficiency. If strain is put upon a large heart with small waves, it is exceptional to see large waves during or immediately after the strain. It simply speeds up, and thus shows poor quality. If it should show waves of increased amplitude, it then would show a large heart with preponderance of good quality of muscle, and plenty of reserve power.

The question of hypertension and fairly large hearts is interesting but difficult of satisfactory explanation, as here, in the majority of cases, you see comparatively small waves or waves of medium amplitude, suggesting inferior muscle, and while it is true that even severely degenerated hearts can maintain high pressure, it is the exception and not the rule, and it is reasonable to believe that in early stages of hypertension, the heart muscle was still of good quality, so why the small wave? It may be that the peripheral resistance prevents a large wave, or the heart does not empty itself thoroughly because of the great resistance. The size of the waves in these cases may depend upon the diastolic pressure—the lower the diastolic, the larger the waves.

In my experience, cases in which the systolic pressure average 220 and the diastolic 110, showing a pulse pressure of about 110, the waves are not as large as in cases with the same pulse pressure but in which the diastolic is below 100. It may be that as the patient's heart changes its position and lies more horizontally, the direction in which the muscle contracts is so altered as to become fluoroscopically invisible, just as in normal cases the action of the right ventricle, because of lack of margin, is barely visible.

As to technique: The patient should be placed in the proper position for examination. You should not judge the heart by observation in the frontal position alone. Either the left anterior oblique position or preferably the right posterior oblique position is best, and the patient should be rotated to his most favorable angle, which may be ten, fifteen, or thirty degrees. This makes the left ventricle present in its entire border and so most favorable for observation.

Large layers of fat over the lower front chest frequently interfere with the visibility. Examination in the posterior oblique position frequently gives a clearer view. Some patients never thoroughly expand their lungs. In these cases, have your patient inhale deeply several times before commencing your examination. This may fill the lung fields with air.

Now, judging the heart which contracts and relaxes vigorously and so has waves of fairly large amplitude as having a preponderance of good quality of healthy muscle, we have all grades and sizes of pulsatory waves down to no visible action, and yet no definite standards. If we keep in mind the vigorous action of a small heart, and then of the heart in a well built and healthy individual, we will have certain mental standards for comparison. I offer to the inexperienced, the following suggestion: The closer the visible action of the left ventricle approximates the visible action of the right auricle, the poorer the quality of the heart musculature in general. You know that if the ventricles were only as strong as the auricles, then you would have a very weak heart, so if the visible action of the left ventricle approximates the visible action of the right auricle you can surmise that your ventricle is no stronger than your auricle. That is your index—no figures, no measurements—just observation.

Before concluding, I will briefly quote two cases out of a series of thirty-four, which were submitted to four of the resident physicians of Stanford University in order to prove the feasibility of this method.

The first case was one of Dr. Kroll's, complaining of fatigue on moderate effort, moderate dyspnea, and attacks somewhat resembling fainting attacks. The physical examination was negative; the roentgenologist's report stated that the heart was normal in size and in shape. Should this patient be dismissed with the advice to return if his feet became swollen and he gasped for breath? The fluoroscopic report stated that the heart was enlarged in an anterior-posterior direction, and that the quality of the muscle was poor, because the amplitude of its waves was very small. This put the clinician on his guard. Electrocardiograms were ordered, and the report stated that abnormality was present, the exact nature of which could not be determined. Then your complete X-ray examination was the first suggestion that some pathology was probably present to account for the patient's symptoms.

The next case, Mrs. C. C., complained of palpitation, which is a common complaint and often has no significance. Again, the physical examination was negative, except for a moderate rise in blood pressure. The radiographic report stated that the heart was on the upper limit of the normal. Should we wait for the postmortem examination before making a diagnosis? The fluoroscopic report stated that the quality of the muscle was poor, because the amplitude of its waves was small and lacking in vigor. Electrocardiographic report stated "branch bundle block." If the ordinary X-ray examination had been depended upon, it would have misled the doctor. A complete X-ray examination placed this method nearly on a par with the most accurate instrument for cardiac examination which we have.

Changes in size and shape are not the only characteristics suggesting abnormal function. A decrease in muscle energy or tone, as is shown by a visible lessening in the amplitude or vigor of its pulsatory waves, is often an aid in judging the quality of muscle.

Now, I am not suggesting the possibility of determining any particular cardiac disease. I am suggesting the possibility of determining the probable

efficiency of the heart muscle. Any one of the five qualities of the heart muscle may be defective, myocarditis may be present, or the muscle may merely be poorly nourished. In either event the quality of the muscle is poor.

I can confirm what Holmes, Bissell, Bishop, Vacquez and others have stated, viz.: That one can judge the probable efficiency and reserve power of the heart by a fluoroscopic study of its pulsatory waves, and in the study of these pulsatory waves, I consider:

(1) Their amplitude;

(2) The completeness with which each contraction is carried out—whether the waves are a mere marginal flicker or a vigorous action;

(3) Whether the waves are limited to certain areas only;

(4) Absence of waves from normal area;

(5) By comparing the ventricular action to that of the auricular action, you have a simple index as to cardiac efficiency.

You may say that before the physician can find objective signs of heart disease or the patient has a heart complaint, the roentgenologist may recognize potential heart disease.

ABSTRACT OF CURRENT LITERATURE

Edling, L.: Results of the Treatment of Basedow's Disease by the Roentgen Rays (Erfahrungen ueber die Roentgentherapie bei Morbus Basedowii). *Fortschr. a. d. Geb. d. Roentgenstrahlen,* 1923, xxx, 117.

Edling gives the results obtained in thirty cases of exophthalmic goiter which he treated by the roentgen rays. In twenty-five of these cases the symptoms were very evident. According to him the symptoms of greatest importance are emaciation and weakness due to disturbance and injury to the nutritive functions, the occurrence of glycosuria, rise in temperature, cardiac enlargement, increased pulse, diarrhea and sweats. The value of treatment is judged from the point of view of the effects on these symptoms. In the thirty cases under review the customary medical and hygienic measures were employed, in addition to the roentgen-ray treatment, and Edling found that about one-third of the cases were relieved of all symptoms; more than 40 per cent improved; 20 per cent showed no improvement or died; and over 6 per cent showed some relapse. The greater part of the cases showed improvement within four months after commencement of the roentgen treatment.

As compared with surgical treatment of exophthalmic goiter roentgentherapy gave about equally good results. The surgical treatment actually gives a larger number of cures and more quickly than roentgen therapy, but there are always the post-operative risks to be counted upon, which are not confined to the worst class of cases, as about 10 per cent of the less serious cases of those operated upon die.

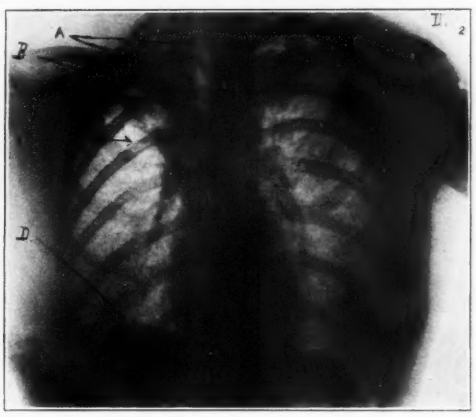
The failures in roentgen-ray treatment of exophthalmic goiter generally occur in the very serious cases; but the reasons why it should fail in such cases are not clear and depends probably upon insufficient knowledge of the pathology of the condition.

ROENTGENOGRAPHIC PESSIMISM

By JOHN D. MacRAE, M.D., AND THOMPSON FRAZER, M.D., ASHEVILLE, NORTH CAROLINA

IT is a truism that every new device or procedure must pass through many stages before its usefulness can be properly evaluated. Ever since X-rays first came into use for study of chest conditions the error has been made of over-estimating their importance as a diagnostic measure, in that the shadows associated with quiescent tubercle were interpreted as representing active disease. Years of experience correlating clinical and pathological data with X-ray findings have shown us that we can not rely on the evidence afforded by X-rays to the exclusion of other studies. Just as we have in the past given too much value to fluoroscopy and films from a diagnostic viewpoint, so have we been guilty of mistakes when using this means solely to arrive at a prognosis.

Case I. *A*, Cavity walls; *B*, Bands (fibrosis); *C*, Calcification.

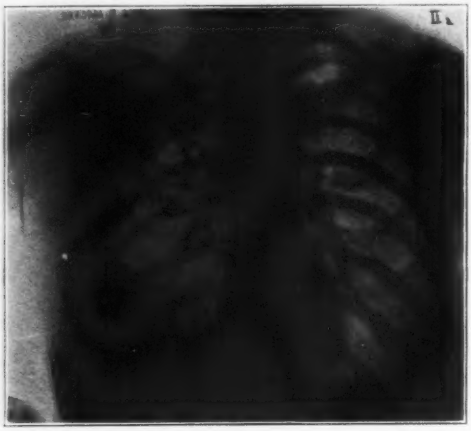


Case II (1). *A*, Trachea deviated to right; *B*, Cavity; *C*, Splotchy area; *D*, Adhesion to diaphragm.

It is not for us to undervalue X-ray films as a prognostic index, but we feel that prognoses are sometimes hazarded on the appearance of films which are not justified by the subsequent course of the case. We have, on the one hand, given a hopeful outlook when X-rays showed few pathological changes, only to watch the case progress rapidly to a fatal termination; while, on the other hand, expressing a dire prognosis when the changes were extensive, we have had our prognosis refuted in that the patient had returned to his former work and remained well during a period of years. While extensive changes indicate a serious condition, we believe, in the light of our experience, that the roentgenographic pessimism now existing is not justified, for even in cases which have terminated fatally, reparative processes have held the disease in check so that the patient has lived usefully for many years.

What we mean by "Roentgenographic Pessimism" is illustrated by the following cases. Here are shown infiltration, fibrosis, calcification, caseation and cavitation, and it is from the character and location rather than from the extent of these processes that we arrive at a prognosis.

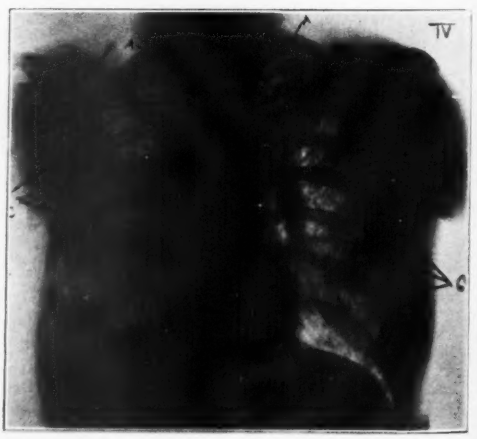
Case I presents evidence of a cavity two inches in diameter in the right upper lobe, with an area of increased density about its outer and upper side; its walls are well-defined and firm, while below the cavity, in the first interspace, are streaks of dense shading. Throughout the left upper lobe are markings similar to those in the right first interspace; in each hilum are also dense, well-defined shadows. Although there has been considerable destruction in this case, the tendency to form fibrous tissue as evidenced by the firm wall to the cavity, the bands of dense shading in each upper lobe, and calcification in each hilum lead one to conclude that repair is going on far more rapidly than destruction, consequently a favorable prognosis was expressed. The clinical course was in keeping with the prognosis; the patient was under treatment for six months and has been at work for a year, and so far our prognosis is upheld.



Case II (2). Cavity.

Case II, represented by films made six months apart, shows that even in the presence of advancing disease our prognosis need not necessarily be unfavorable. In the first of the series (Fig. II, 1), we see narrowing of the rib spaces throughout the right upper chest; the trachea is drawn to the right. The right diaphragm is elevated; there is marked density in the apex of the upper lobe as well as a cavity with thick walls behind the clavicle, while below the cavity in the first interspace is a splotchy area of density. In the left upper lobe there are streaky shadows. In Fig. II, 2, which represents a radiograph taken six months later, the cavity behind the clavicle is less in evidence but below the previous-

Case III. *A*, Caseation and peculiar formation simulating cavity; *B*, Infiltration in apices of upper and lower lobes, left.

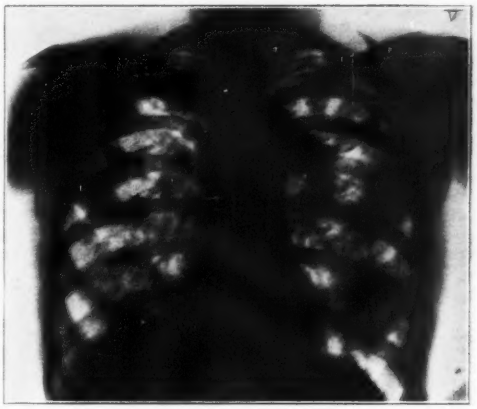


Case IV. *A*, Rudimentary first ribs; *B*, Trachea deviated to right; *C*, Extensive involvement, fibrous in character.

ly described cavity wall, where we noted splotchy densities, we now have a large cavity with well-defined walls. A year has elapsed since the second picture was taken. The patient has improved considerably; cough and expectoration have diminished; weight has increased; there is no elevation of temperature; physical signs indicate presence of a relatively dry cavity. We believe that the clinical and X-ray findings in this case warrant a good prognosis, if the patient will undergo treatment for a sufficient length of time. Although one hesitates to give a favorable prognosis in the face of X-ray evidence of a progressive lesion, accompanied by exacerbation of both signs and symptoms, it should be noted that while exacerbation is going on repair may also be taking place, as in this case.

Case III, a Jewish girl of nineteen years, presents some features of unusual interest. Although no history of continued illness was obtainable and though cough and expectoration were both slight when she presented herself for examination, the X-ray films recorded evidence of a very large cavity in the right upper lobe and splotches of caseation below it and close to the hilum, as well as shadows in the apices of the upper and lower left lobes suggestive of infiltration. In spite of the extensive and destructive lesions in these lungs, we feel that because of the paucity of clinical symptoms and because of the racial resistance that we should give a good prognosis.

Case IV is perhaps the most striking of our series. The patient is a woman of forty-one years who has had the means and intelligence to carry on her fight well. At first glance the extensive changes depicted in all lobes of the lungs would lead us to express an unfavorable diagnosis. After considering the history of the case our views were changed. This woman first knew she was sick nine years ago. At that time she underwent treatment and since then she has enjoyed "good health," recognizing her limitations



Case V. Massive involvement. Caseation and fibrosis.

with regard to exercise. The expectoration is scanty but contains tubercle bacilli.

Case V shows lungs marked throughout with splotchy and striated shadows which suggest caseation and fibrosis with some infiltration going on at the same time. There is no doubt from the history given but that this patient has been tuberculous for the past twenty years. She was a farmer's wife and had worked hard all her life and the disease had not been recognized until shortly before her death. It is only possible to speculate how long such a patient can live in spite of the large amount of tuberculous involvement of the lungs and of the laryngeal and intestinal complications as well.

We have shown by these cases that extensive tuberculous involvement may exist and yet in certain instances a favorable prognosis seems justifiable; in the light of these facts we believe that the "Roentgenographic Pessimism," as it now exists, is too great.

CASE REPORTS

FRAGMENT OF GLASS IN THE BRONCHUS REVEALED BY THE ROENTGEN RAY

By PORTER P. VINSON, M.D., Section in Medicine, and CHARLES G. SUTHERLAND, M.B. (Tor.), Associate in Roentgenology, Mayo Clinic, Rochester, Minnesota

Three cases in which splinters of glass from the windshield of automobiles had penetrated the soft tissues of the face, and the skull, have been observed in the Clinic, but this is the first case in our experience in which the roentgen ray has demonstrated a foreign body of this type in the air passages.

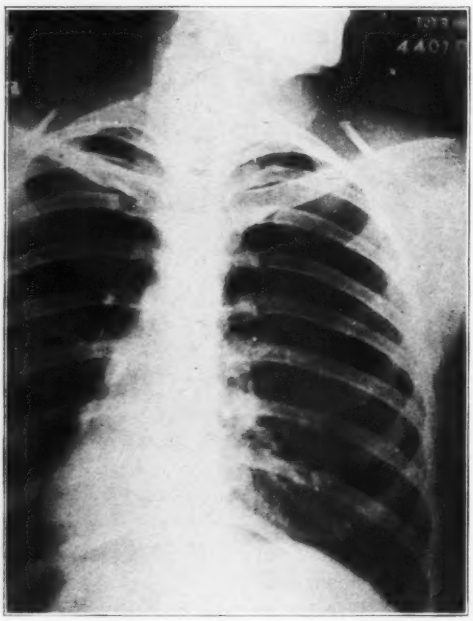


Fig. 1. Shadow of foreign body between the seventh and eighth ribs posteriorly on the left side.

Case A440103, Miss I. M. E., aged 23 years, was examined September 4, 1923. On December 7, 1921, the patient had been in an automobile accident, had had seven teeth knocked out, and had been unconscious for five days. Following this she had paroxysms of cough, which sometimes lasted from one to two hours. Thick yellowish mucus was expectorated. Frequently there had been streaks of blood in the sputum, and during the first six months several rather profuse pulmonary hemorrhages had occurred. In May, 1923, a roentgen examination of the chest had been made elsewhere, and a foreign body, thought to be a tooth, was revealed in the left bronchus. A few days afterward bronchoscopic examination failed to disclose a foreign body. August 10, another bronchoscopic examination revealed granulation tissue in the left bronchus: the foreign body could not be seen. Following this examination the patient was completely relieved of all pulmonary symptoms.

Fig. 2. Fragment of glass taken from the bronchus.

September 4, roentgenographic examination of the chest at the Clinic revealed a shadow in the area of the lower left bronchus, which was believed to be a foreign body; however, it appeared to be considerably larger than a tooth (Fig. 1). Lateral roentgenograms did not show the same shadow. September 6, under local anesthesia, the patient was bronchoscoped, without finding anything abnormal in the bronchial tree. There was no evidence of infection. Further roentgenograms showed that the shadow had been displaced downward. Fluoroscopically, with the patient in the anteroposterior position, the shadow was seen as in the roentgenograms, but in the lateral position it was not seen. September 17, a second bronchoscopic examination was made, and a foreign body was seen in the primary division of the left main bronchus. This was removed easily and proved to be a thin fragment of glass (1 by 1.5 cm.), presumably from the windshield of the automobile (Fig. 2). The patient had no reaction following the operation, and was dismissed from the Clinic the following day. It is difficult to explain why the foreign body had not been seen at the previous bronchoscopic examinations.

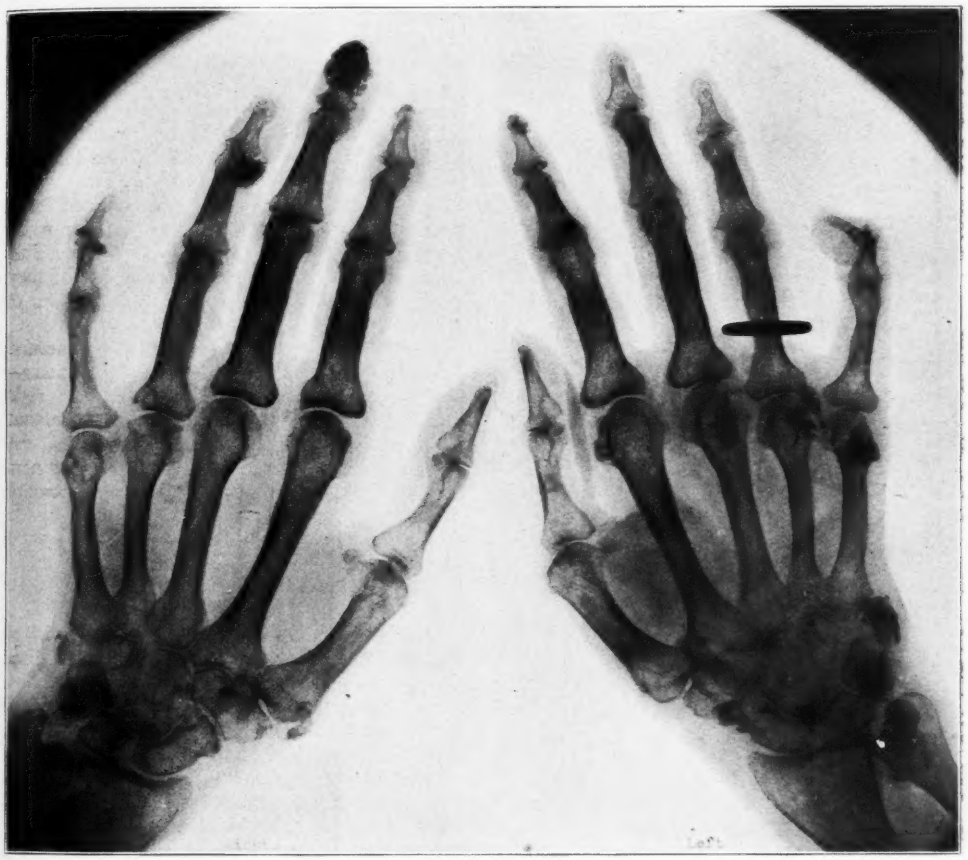


Fig. 1. Scleraderma of both hands.

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A CASE OF SCLERADERMA

By BENJAMIN W. BAYLESS,
Louisville, Ky.

Mrs. L. A. N., white, age 61, married, two children. She had the usual diseases of childhood; no serious illness since except several attacks of so-called rheumatism.

About five years ago she noticed the skin of her hands was getting quite dry and at times would crack very much. It would seem to improve under treatment of ointments, but never was normal and it was usually more marked in winter than summer. She has tried thyroid extract without benefit.

Fig. 2. Calcareous nodules.

At present she has a marked case of scleraderma of both hands, chest and abdomen. The skin of both hands is very dry, hard, and tends to crack in places. The skin has contracted so much over the tips of the fingers that the pulp has been more or less absorbed. The hands feel as if she had on a pair of tight gloves. The skin of the forearm is not affected. The changes are not so marked in the skin of the chest and abdomen, but it is dry and glazed. The feet do not show any changes in the skin. There is practically absence of sweat in the affected areas. The finger nails are two or three times the normal thickness. The muscles of the hands are atrophied and the movements restricted, due to the contraction of the skin. The sensation is normal.

About two years ago she noticed some small, hard nodules on the back of her wrists which have gradually increased in size. They are movable, very hard, and only one of them is slightly tender, which evidently presses on a nerve.

X-ray examination shows a large number of calcareous nodules in both hands,—the largest one is in the tip of the right middle finger and is the size of a hazel nut. This one appears attached to the bone, but probably it only surrounds the bone as none of the others are attached. It shows through the skin in several places as blanched areas, and in one place it protrudes through. Most of the nodules are in the subcuticular tissue, but some of the small ones seem to be in the skin. All the bones of the hands show atrophy and there is atrophic arthritis of all the articulations of the fingers. The distal end of the middle phalanx of the left little finger has been absorbed and what remains is very sharp, nearly protruding through the skin. The terminal phalanx is dislocated. The ungual extremities of all the phalanges show absorption, more marked in the thumbs and index fingers. This is evidently due to the contraction of the sclerotic skin. The great toes show several calcareous nodules, but they are not so numerous or so large as in the hands. There are no nodules to be felt under the skin of the chest and abdomen.

EDITORIAL

M. J. HUBENY, M.D. . . . . *Editor*
EDWARD W. ROWE, M.D. . } *Associate Editors*
BENJAMIN H. ORNDOFF, M.D. }

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UROLOGY AND THE ROENTGEN RAY

In two decades mortality resulting from operations on the urinary tract has been reduced from one death in every five operations to a very small fraction, which may be considered as the mortality of unavoidable accident. Thus is due not only to advances in operative technique, more rigid asepsis or highly developed surgical skill, but primarily to improved methods of diagnostic precision. The existing disease is identified and localized to a definite division of the urinary tract. This permits a rapid surgical approach, a minimum of operative trauma, and a convalescence uncomplicated by the results of an extensive surgical exploration. Chief among the methods of diagnostic precision, an integral part of the entire investigation, without which the urologic surgeon would revert to practices of twenty years ago, we find the roentgen ray.

What unforeseen developments have arisen since the day, twenty-seven years ago, when W. W. Keen stated that renal and bladder stones could not be diagnosed by the roentgen ray as they were embedded in tissues too thick to be permeable to the rays. That same year (1896) after repeated failures by many investigators, Macintyre, of Glasgow, obtained the first positive radiograph of a kidney stone; at operation the stone was found in the renal pelvis. The advances from the 12-minute exposure and the 6-inch spark gap of this first successful attempt, to our present-day accuracy and rapid delineation are intimately associated with the development and success of urologic diagnosis. This accuracy of diagnosis is illustrated in a large series of cases where only 3 per cent of renal stones fail to cast a shadow in the original roentgenogram. This proportion of failures corresponds to the small number of renal stones having a density insufficient to cast a shadow.

The modern urologist requires and depends upon a roentgenograph of the entire urinary tract before attempting an extensive examination. This preliminary radiograph reveals stone formation, calcareous deposits in neoplasms or advanced infections, and also not infrequently, visualizes the kidney itself. The subsequent urologic investigation is, in most cases, focused on the roentgenographic result.

During the early period of evolution of the sciences of roentgenology and urology, lithiasis was one of the most common and most frequently recognized causes of urinary disease. In many cases of renal pain, infected urine, or in cases where early history suggested urinary calculi, radiography was resorted to and the roentgenogram was the only criterion indicating future procedures.

With advances in technique, radiographic definition became more acute, the softer shadows of fecaliths, the outlines of calcified glands, and the rounded multiplicity of phleboliths caused confusion and led to diagnostic errors. Shadographic catheters suggested by Tuffier, in 1897, aided markedly in in-

dicating the relationship of these shadows to the urinary tract.

In meeting the requirements of the World War, many new ideas were developed; necessity demanded and created previously unthought-of methods of examination and many new types of apparatus. A number of these procedures and appliances have been successfully utilized in civil surgery, none more satisfactorily than that of localizing foreign bodies with the fluoroscope. In the removal of renal stones, destruction of renal tissue, infection, increased operative mortality and postoperative disability were not infrequently caused by wide splitting exposures and extensive manipulation of the kidney. The fluoroscope at the operating table limits exploration and tissue trauma by definitely localizing the stones and indicating the presence or absence of further fragments. Small portions of stone, ordinarily overlooked, may thus be removed, eliminating the most common nucleus of stone recurrence.

Voeclker, in 1907, while making a cystogram, accidentally filled a dilated ureter and pelvis with an opaque medium, thus laying the foundation of our present-day perfection in pyelography. Following this the diagnosis of urinary calculi no longer occupied the stellar position in investigations of the upper urinary tract. Pyelography added a host of other conditions to the small group of recognizable renal lesions. Infections, cystic degenerations, congenital anomalies and neoplastic conditions, all have their individual and readily recognized peculiarities of outline.

Quite a contrast in accuracy of diagnosis is offered between the status of 1895, when A. O. J. Kelly reported a large series of renal tumors, 72 per cent of which came to autopsy undiagnosed, and that of our present period, when the pyelogram almost invariably permits a correct diagnosis of tumors even in early stages when the lesions are small and operable.

The group of shadow-casting substances introduced through the alimentary canal and blood stream which are excreted through the urinary tract, offers an attractive opportunity for urologic research. At the present time work on this method of picturing the urinary tract has only been suggested and awaits the hand of the investigator to mold it so that it may be safely applied to clinical work.

A. J. SCHOLL, M.D.

AMERICAN COLLEGE OF SURGEONS

Report of the Hospital Conference held at the Clinical Congress of the American College of Surgeons, October 23, 1922, Boston.—Section D, Roentgenological Service, by William A. La Field, M.D., Bridgeport, Conn.

It has been suggested that our discussion of this subject be limited largely to the extent and supervision of X-ray service in hospitals. Accordingly, our program contains the following questions to guide our discussion:

1. Hospitals today are asking what should constitute a complete service in an X-ray department. Should all institutions be able to perform fluoroscopic examinations, gastro-intestinal work and treatment?

2. In many hospitals today the X-ray department is under the management of trained technicians. It is generally stated that interpretation of X-ray plates can only be done successfully by the trained medical man. In such places as cited, interpretation has to be left to the individual physicians referring cases. Is this satisfactory, and can you have an efficient X-ray service in this manner?

I have great reluctance in coming before you and attempting to give precise answers to some of your problems as to the X-ray laboratory in a small hospital. May I say first a word as to the responsibility of the roentgenologist. In the first place, the responsibility for the service must be left to a competent roentgenologist who must be a graduate physician well versed in anatomy and physiology; he should be a competent physician, so that he may study with you the essential data regarding his X-ray finding and give you an intelligent interpretation. He must have a fair working knowledge of radio-physics. He must be a good amateur photographer, something of an electrician, and something of a politician. The technician—the individual who does the routine work of the laboratory—should be a graduate nurse trained by a roentgenologist and should follow a definite routine technique in all roentgen examinations; and she must work under the supervision of an attending roentgenologist. She must confine her activities entirely to X-ray practice. She must work under such supervision that she will realize her limitations and responsibilities.

With a hospital of perhaps 100 beds or in a community of 25,000 or 50,000, it is not usual to have a man giving his entire thought and attention to the practice of roentgenology as a profession. A community as small as that will not adequately support a man doing roentgenology as a specialty. In any hospital measuring up to the standard of the American College of Surgeons there is no reason why this department could not be placed under the intelligent supervision of a roentgenologist who is not necessarily an active member of the hospital staff. He may be a man in a comparatively remote place from the hospital he serves. It seems to me the first plan would be to establish a small department under the immediate supervision of a graduate nurse who has been trained in this work.

Perhaps we can best bring out the answer to the first question, "What should constitute a complete service in an X-ray department?" by giving you first the limitation of your roentgen service. There is no doubt in the mind of every man doing extensive work in this line that every hospital should be equipped to do roentgenological examinations of the gastro-intestinal tract, chest, skull, and the urinary tract. Some hospitals leave the entire charge of roentgenology to a technician. Would you rely upon the opinion of an orderly or a nurse for an interpretation of the changes in the renal pelvis? Would you rely upon the opinion of a high school graduate, not a graduate physician, as to the significance of a tuberculous lesion in an extremity? In my mind there is no question as to who should assume the responsibility of X-ray interpretation.

The interpretation of X-ray plates cannot be left to the various members of the hospital staff. The relationship of the roentgenologist to the staff is the relation of the consultant to the physician. If the roentgenological service is to be of any real value in your hospital you must look upon your roentgenologist as a consultant. If the roentgenologist is of the right type his opinion is just as valuable as the opinion of your attending neurologist. In our hospital we do not send a requisition for an X-ray examination; a consultation is arranged and the patient is referred to the X-ray department for consultation. If a medical roentgenologist is in charge of the X-ray department he should be equipped to do roentgen therapy. That is a procedure of such responsibility that it cannot be left to a technician no matter how well trained.

I am in a position to judge somewhat of the X-ray needs of a hospital in a small community, and I believe we have solved the problem for one hospital in our state near Bridgeport. A hospital of about 100 beds in a community of 25,000 has a competent graduate nurse in charge of the roentgenological service and the films that are taken there are sent to us for interpretation. A roentgenologist can in the course of two or three months train a graduate nurse in the roentgen examination of the gastro-intestinal tract so that she can produce a series of plates following out a standard technique. A movement has now been instituted by the American Roentgenological Society to standardize X-ray reports. A long time ago routine examinations were standardized as to technique, and the standardization of the report and the individual interpretation of it will mean adequate service for the small hospital.

I believe that technicians assuming the responsibility in hospital X-ray service should be examined as to their fitness for the work, be registered, kept within their limitations.—*Reprinted by permission from "Surgery, Gynecology and Obstetrics," Jan.,* 1923.

IN UNION THERE IS STRENGTH

The development of radiology during the last twenty-eight years has involved the training of a large number of physicians in the technical details, and in the special anatomic, physiologic and pathologic problems presented by this new science. The adjustments and readjustments in medical practice made necessary by such factors have forced into the background other considerations of real, but for the time, secondary importance.

A review of the situation of radiology in America as it exists to-day impresses one with the fact that one great source of weakness is its lack of unity and solidarity. Instead of one strong organization whose sole aim is to raise the general standard as well as the status of American radiology; instead of one strong, well-edited journal that is a source of pride to every member of the specialty; instead of maintaining a research laboratory for the study of radiologic problems, to work out and fix standards in X-ray apparatus for the benefit of both the radiologist and the manufacturer; instead of appointing an international committee to revise the nomenclature of radiology to the end that some day radiologists may learn to speak the same language; instead of undertaking to carry out any of these necessary and desirable objects, and to put our house in order, we have been dissipating our energies in too many societies, too many meetings and too many journals; indeed, if certain movements which are afoot should be consummated the division is likely to become still greater.

The keystone of a proposed structure is the unification or amalgamation of existing radiologic societies into a single organization, whose aims should be: (1) to recognize past, present and future achievements of its members and to stimulate them to further effort; (2) to publish a journal of radiology that shall be a constant source of pride and inspiration to American radiologists; (3) to arrange international conferences on such questions as nomenclature, dosage standards, and so forth; (4) to establish and maintain a research laboratory of the highest type for the study of the physical, biological and chemical actions and reactions of the radiations; or, if the foregoing should prove to be too ambitious, to arrange with some reliable institution, such as the National Bureau of Standards, to render such service. For instance, the variability in X-ray output between supposedly similar tubes under the same conditions of excitation is well

known. Would it not be desirable, therefore, to establish a standard requirement for tubes of a given type, such tubes being kept at the Bureau of Standards where radiologists, for a nominal fee, might send their own tubes for comparison? It is also known that the output of a given transformer may vary considerably from time to time—indeed, from day to day—without any change in the tube itself, such variation amounting at times to as high as 10 to 15 per cent. Does not this seem of sufficient importance to demand investigation? If the causes of such variation lie in details of construction, should not the knowledge of such causes be of the highest importance to the manufacturer, to the radiologist and to the patient? How can such sources of error be removed unless the causes are known?

How may such unification be accomplished? First, by recognizing the weakness of the present situation; second, by not "passing the buck" from one side of the field to the other, a process which may serve the personal interests of a few and satisfy the vanity of others, but does react against American radiology as a whole, and third, to set ourselves the collective goal of breaking our fetters and of bearing the flag of American radiology to the front line of American medicine.

ARTHUR U. DESJARDINS, M.D.

THE ROCHESTER MEETING

Accustomed for decades to entertaining medical visitors, Rochester welcomes physicians and willingly gives them its best. It will not be in the least dismayed by the many hundreds who will come to the Annual Meeting, and it will prepare to look after their comfort and pleasure.

Rochester is primarily a medical center, and the care of the sick is its essential industry. It is a city of clinics and hospitals and there is little to distract the attention and interest of the visiting doctor.

TRANSPORTATION

Excellent train service is afforded by the Chicago Great Western and Chicago & Northwestern railways. Both roads carry special sleeping cars to Rochester from Chicago. The Chicago Great Western operates a special sleeper from Kansas City, and the Chicago & Northwestern one from Omaha. Passengers arriving in the early morning may occupy their berths until a reasonable hour for rising. Frequent day trains from Minneapolis and St. Paul are run by the Chicago Great Western. Principal schedules follow:

Lv. Chicago		Ar. Rochester
8:15 A. M.	C. & N. W.	9:00 P. M.
8:01 P. M.	C. & N. W.	7:15 A. M.
6:30 P. M.	C. G. W.	6:50 A. M.
Lv. Omaha		
7:45 P. M.	C. & N. W.	8:50 A. M.
Lv. Kansas City		
2.40 P. M.	C. G. W.	6:50 A. M.

Full information regarding reduced fares was given in the October number of RADIOLOGY, but the following instructions may be repeated:

Tickets at the regular one-way fare for the going journey may be purchased Nov. 28 to Dec. 5 (not on other dates). Ask for a *certificate* (not a receipt) when buying going tickets. If no certificate can be obtained, ask for a receipt. Immediately on arriving in Rochester present this certificate (or receipt) at the registration office of the meeting, where it will be validated by Dr. Trostler, manager of transportation, and by the joint agent of the railroads. If 250 certificates are presented —and far more than this are expected —each certificate holder will be entitled to return at half fare over the route used in coming. Certain extra-fare trains of some roads will not honor such reduced fare tickets.

Arrangements are being made for special trains leaving Chicago Sunday

evening, Dec. 2. It is hoped that all who plan to come via Chicago will avail themselves of these trains, as they will afford an opportunity for the members to get better acquainted. Dr. Trostler, 25 E. Washington St., Chicago, invites correspondence concerning these trains.

Hotels

The hotels of Rochester are numerous and commodious and, although the anticipated large attendance at the meeting, together with the usual number of transients, will doubtless tax their capacity, they have agreed to reserve an ample number of rooms, and accommodations are assured for all who come to the meeting.

Mr. Roy Watson, Secretary of the Committee on Hotels and Banquets, has already sent out application cards, and members are urged to fill out and return these cards in order to secure reservations.

Headquarters and Assembly Hall

To secure ample housing for the meeting, the First Methodist Church has been leased for the occasion. The church is only a block from the Clinic, and is quite near the principal hotels and the down town section. Its auditorium is capacious, with excellent acoustics. Headquarters, sessions and exhibits will all be in this building. The registration office will be open here at 9 o'clock Monday morning, Dec. 3, and daily thereafter until the meeting is concluded.

Exhibits

All exhibits, both scientific and commercial, will be displayed on the ground floor of the building. The rooms are large, well lighted and easy of access from the entrance and auditorium.

Commercial exhibitors can obtain complete information regarding space by corresponding with Dr. I. S. Trostler, 25 E. Washington St., Chicago.

Dr. C. G. Sutherland, Mayo Clinic, Rochester, is the chairman of the local committee in charge of scientific exhibits. Members who intend to contribute to the exhibition should write to Dr. Sutherland at once, giving number and size of films or plates to be shown. This should not be neglected as the time is close at hand.

Entertainment

The officers and counselors of the Society will be the guests of the President at luncheon, Wednesday, Dec. 5th.

During the meeting, entertainment for the ladies will be provided in the way of theater parties, afternoon teas and motor car trips.

Tuesday night, Dec. 4th, there will be a reception and get-together smoker for the members in the lobby of the Clinic. The officers are not acquainted with many of the members, and the purpose of this reception is to promote acquaintance and good fellowship.

Plans for the banquet at the Kahler Thursday night, Dec. 6th, are maturing and details will be announced in due time. Members are asked to indicate on the cards sent them by Mr. Watson whether they desire or not to attend the banquet. The banquet hall is of limited capacity, and seats will be allotted in the order of reservation until all are filled. Dr. W. J. Mayo will address the banqueters.

Calendar

Monday, Dec. 3rd

8 A. M. Clinics in the amphitheater, surgical pavilion, St, Mary's Hospital.

2:30 P. M. Executive session in assembly hall, Clinic building. This session will be continued in the evening after the usual dinner. (Officers desire that as many as possible of the counselors and members be present on Monday in order to dispose of business matters the first day and leave the committeemen free to attend the Scientific Sessions.)

Tuesday, Dec. 4th

8 A. M. Address of welcome at the Church, by Dr. Charles H. Mayo. Response by Dr. A. W. Crane.
8:30 A. M. and 2 P. M. Scientific sessions.
5:00 P. M. Clinic by Dr. A. U. Desjardins, sun parlor of Kahler Hotel.
8:00 P. M. Reception and get-together smoker, Clinic lobby.

Wednesday, Dec. 5th

8 A. M. Scientific session.
12:15 P. M. Luncheon to officers and counselors by the President.
2:00 P. M. Scientific sessions.
5:00 P. M. Clinic by Dr. H. H. Bowing, sun parlor, Kahler Hotel.
8:15 P. M. Staff meeting of Mayo Clinic in lobby of Clinic building. Program will be furnished by members of the staff and will deal as far as possible with radiologic problems.

Thursday, Dec. 6th

8 A. M. and 2 P. M. Scientific sessions.
5:00 P. M. Clinic by Dr. A. U. Desjardins, sun parlor, Kahler Hotel.
7:00 P. M. Annual banquet, main dining room, Kahler Hotel.

Friday, Dec. 7th

8 A. M. and 2 P. M. Scientific sessions.
5:00 P. M. Clinic by Dr. H. H. Bowing, sun parlor, Kahler Hotel.

Saturday, Dec. 8th

8 A. M. Clinics in the amphitheater, surgical pavilion, St. Mary's Hospital.

PRELIMINARY PROGRAM

A. C. Ivy, B. H. Orndoff and A. Jacoby, Chicago, Ill.
"The Effect on Gastric Secretion of Exposure of the Abdominal, Thoracic and Limb Areas to X-ray."

Henry Schmitz, Chicago, Ill.
"The Clinical Significance and Treatment of Radiation Toxemia."

Bundy Allen, Iowa City, Ia.
"Nasal Accessory Sinuses in Infants and Children."

Max Kahn, Baltimore, Md.
"Primary Multiple Neoplasms Simultaneously Involving the Alimentary Tract. Case Report."

Burton J. Lee and Ralph E. Herendeen, New York City, N. Y.
"What can be Done for Primary Inoperable Carcinoma of the Breast?"

C. Winfield Perkins, New York City, N. Y.
"Roentgen Studies of Cardiac Disease in Children."

M. J. Sittenfield, New York City, N. Y.
To be announced.

Rollin H. Stevens, Detroit, Mich.
"Cold Facts in Cancer Therapy."

Wm. F. Braasch, Rochester, Minn.
"Fluoroscopy of the Kidney at the Operating Table."

E. H. Kessler, St. Louis, Mo.
"Our Mistakes."

Boyd S. Gardner, Rochester, Minn.
"The Place of the X-ray in Dental Diagnosis."

Douglas Quick, New York City, N. Y.
"Treatment of Carcinoma of the Mucosa of the Cheek."

Leon T. LeWald, New York City, N. Y.
"Thoracic Stomach: Differentiation from Eventration and Hernia of the Diaphragm."

P. P. Vinson, Rochester, Minn.
"Clinical Value of the X-ray in the Diagnosis and Treatment of Diseases of the Esophagus."

Lewis Gregory Cole, New York City, N. Y.
To be announced.

R. D. Carman, Rochester, Minn.
"Radiodiagnosis of Cholecystic Disease."

A. W. Adson, Rochester, Minn.
"Ventriculography."

C. D. Enfield, Louisville, Kentucky.
"Acromegaly Treated by X-ray; Report of a Case."

A. U. Desjardins, Rochester, Minn.
"Blood Count and Blood Pressure in High Voltage Therapy."

W. H. Wallace, Brooklyn, N. Y.
"Spondylitis; the Submerged Pathologic Entity in the Diagnosis of Obscure Conditions in the Abdomen."

Roy Kegerreis, Rochester, Minn.
To be announced.

E. W. Rowe, Lincoln, Nebr.
"A Compact X-ray Treatment Unit."

H. W. Myerding, Rochester, Minn.
"Roentgenologic Findings in Bone Tumors."

Amédée Granger, New Orleans, La.
"The Importance of the Granger Line in the Diagnosis of Disease of the Sphenoid Sinus, with Illustrative Cases."

P. M. Hickey, Ann Arbor, Mich.
"Undergraduate Instruction in Roentgenology."

J. Thompson Stevens, Montclair, N. J.
"Modern Methods in the Treatment of Cancer of the Breast."

R. B. Wilsey, Rochester, N. Y.
"The Measurement of Intensifying Factors of X-ray Intensifying Screens."

Wm. Engelbach, St. Louis, Mo.
"Osseous Development in Endocrine Disorders."

A. W. Crane, Kalamazoo, Mich.
"A Reconsideration of the Depth Dose in Roentgen Therapy."

L. R. Sante, St. Louis, Mo.
To be announced.

A. H. Logan, Rochester, Minn.
"Chronic Ulcerative Colitis; Its Clinical and Radiological Aspects."

Mary Elizabeth Hanks, Chicago, Ill.
"The Roentgen Ray as a Gynecologic Remedy; a Clinical Estimate of 200 Cases."

W. A. Newman Dorland, Chicago, Ill.
"Obstetric Roentgenography."

Gordon B. New, Rochester, Minn.
To be announced.

Alfred J. Mitchell, Chicago, Ill.
"Roentgenology from the Standpoint of Industrial Surgery."

Irving F. Stein and Robert A. Arens, Chicago, Ill.
"Interpretation of Roentgenograms in the First Half of Pregnancy."

Edward L. Jenkinson, Chicago, Ill.
"Roentgen Therapy of Breast Carcinoma."

A. W. George, Boston, Mass.
"The Vertebræ—Observations on the Changes Incident to Injury and Disease."

Sherwood Moore, St. Louis, Mo.
"The Roentgenology of the Fifth Lumbar Vertebra, in Some of Its Aspects."

Otto Glasser, New York City, N. Y.
"The Seemann Spectrograph."

W. E. Hart, Decatur, Illinois.
"Dilatation of the Stomach."

Albert Soiland and Wm. E. Costolow, Los Angeles, Calif.
"Short Wave X-rays in Other than Deep Conditions."

Chas. G. Sutherland, Rochester, Minn.
"A Radiological Study of Soft Tissue Tumors."

Lester Levyn, Buffalo, N. Y.
"Madelung's Deformity."

O. W. McMichael, Chicago, Ill.
"Artificial Pneumothorax."

Wm. L. Clark and Eugene C. Asnis, Philadelphia, Pa.
"Clinical and Microscopical Evidence why Electrothermic Methods are Efficient in the Treatment of Malignant Disease."

Isador Pilot, Chicago, Ill.
"X-ray Studies of Fuso-Spirochete Pulmonary Infections."

R. G. Giles, Boston, Mass.
"Deep Radiotherapy in Benign Hypertrophy of the Prostate."

Frank S. Bissell, Minneapolis, Minn.
"Certain Non-Tuberculous Chronic Lung Lesions as Revealed in Roentgenograms —What Is Their Probable Significance?"

R. T. Wilson and J. B. Johnson, Temple, Texas.
"A Study of the Lymphatic System in Its Relation to High Voltage Therapy."

I. Seth Hirsch, New York City, N. Y.
"A Biographical Sketch of Roentgen."

Robert H. Millwee, Dallas, Texas.
To be announced.

Joseph C. Beck and Francis L. Lederer, Chicago, Ill.
"Pre- and Postoperative Interpretation of X-ray Films About the Head and Neck."

Edwin C. Ernst, St. Louis, Mo.
To be announced.

Robert I. Rizer, Minneapolis, Minn.
To be announced.

Robert S. Allison, Minneapolis, Minn.
To be announced.

H. J. Ravold, St. Joseph, Mo.
"Hemangioma with Calcification, Pre- and Postoperative X-ray Findings."

Clarence O. Simpson, St. Louis, Mo.
"A Reflex from the Trigeminal Branch of the Society."

Montford Morrison, Chicago, Ill.
"Differences in X-ray Measurements."

Leon J. Menville, New Orleans, La.
"Organized Medicine and Its Relation to Radiology."

W. W. Wasson, Denver, Colo.
"The Gross Pathology of the Chest."

L. J. Carter, Brandon, Manitoba.
"Pathology of the Right Upper Abdomen: Value of X-ray Signs as Checked by Operative Findings; Analysis of a Series of Cases."

W. I. Le Fevre, Cleveland, Ohio.
"Recent Roentgenographic Findings in Cases of Severe Gunshot Wounds Received During the World War."

H. H. Bowing, Rochester, Minn.
"Radium and Roentgen Therapy of Advanced Carcinoma of the Breast Prior to Amputation."

Frances A. Ford, Rochester, Minn.
To be announced.

THE COMMERCIAL EXHIBIT

I. S. TROSTLER, M.D., F.A.C.R., F.A.C.P., CHICAGO

The Commercial Exhibit at the Rochester meeting bids fair to exceed any of those shown at previous meetings. It will be held on the ground floor of the First Methodist Church at Rochester.

It has been the main effort of the writer to bring together as many of the manufacturers of apparatus as possible at these exhibits. The educational value of such exhibits cannot be overestimated. The opportunity for the visiting physicians to compare the different makes and types of apparatus side by side, and to become acquainted with the different arguments of the respective salesmen, dealers, and manufacturers, is of inestimable value. Aside from this, the opportunity given the manufacturers to display their wares makes it worth while for them as well as for us.

We have purposely refused the sale of large areas of space to one or more manufacturers, deeming it of greater benefit to all to have a large number of exhibitors, rather than a few large exhibits.

THE EXHIBITORS

ACME-INTERNATIONAL X-RAY COMPANY, of Chicago, will show in spaces 14, 15, and 16 a complete line of "Precision Type" Roentgen apparatus. This will include several of their generators, incorporating the "rectifier with sphere gap characteristics," the Deep Therapy tube stand with protective cylinder, and the "Precision Type" Magnetic Sphere Gap. The latest addition to their line, the Vertical Stereo-Plate Changer, will also be exhibited.

GEO. W. BRADY & COMPANY will exhibit in space 26 a number of new items, among which is their Potter-Bucky Diaphragm with a number of new features, including an attachment for operating the time switch, making the exposures automatically from one-half second up. They also will have a new type of Fluoroscopic Bucky Diaphragm with curved screen, and measuring devices for indicating the proper dosage of X-ray treatments, with a working demonstration of same. They will also show a combination Bucky and Fluoroscopic Table. George will be on hand (with a supply of pencils, of course).

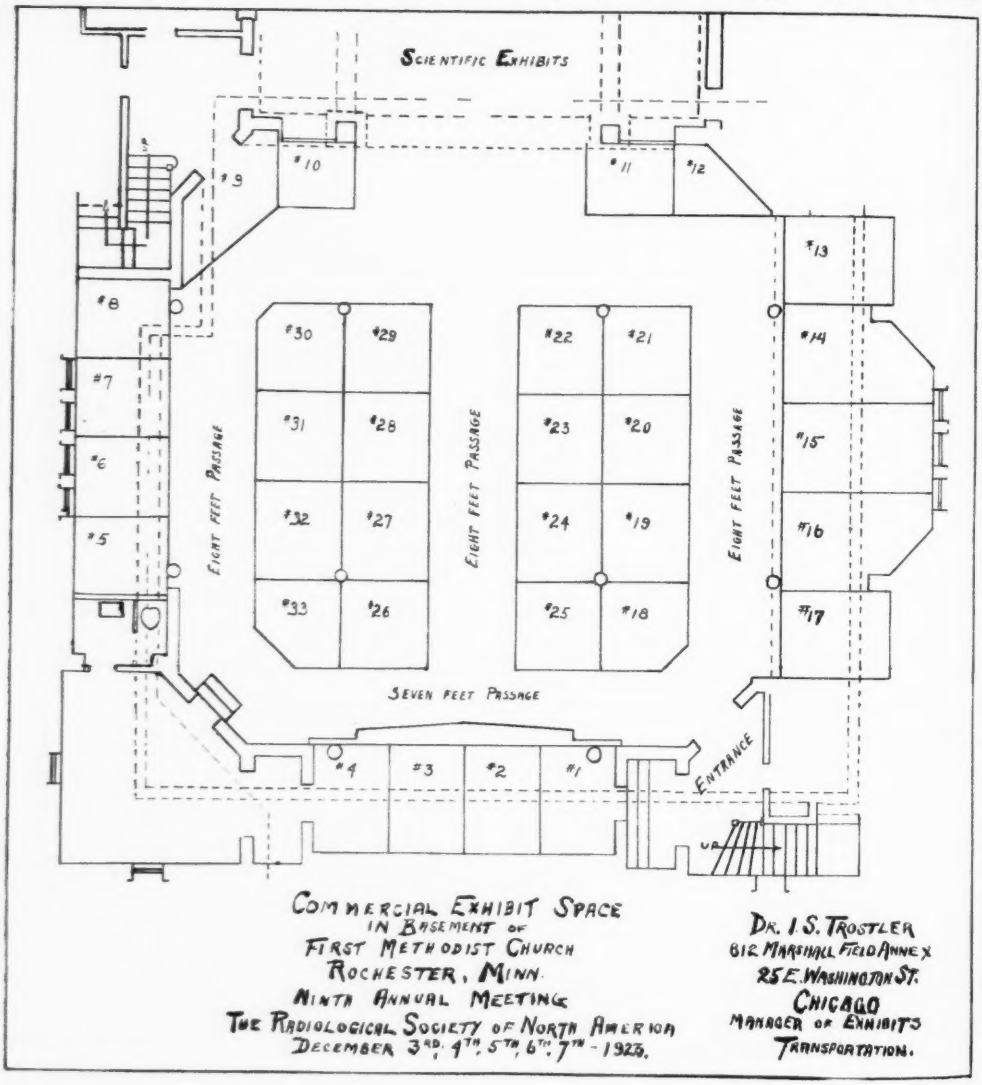
BUCK X-OGRAPH COMPANY, of St. Louis, will occupy space No. 23 and aside from the usual exhibit of Dental Films, Developing Chemicals, etc., will show X-Ograph Contact Cassettes and X-Ograph Ultra-Rapid Durable Intensifying Screens —a combination worthy of your careful consideration.

The Raper Angle Meter will also be shown. This is a new and useful instrument for indicating the radiographic angle of the teeth. This is something which should not be overlooked. The exhibit will be in charge of Mr. Buck.

In space number 9, the BURDICK CABINET COMPANY, of Milton, Wis., will display their new quartz lamp which makes possible the establishment of the mercury vapor arc without tilting of the burner, preventing mechanical shock, adding to burner life and establishing the arc stream at full efficiency in from two to three minutes rather than the twelve to fifteen minutes previously required. It is so constructed that raising or lowering over the treatment table, rotation in any horizontal plane, and effortless horizontal movement permit perfect adaptation to every possible treatment requirement

with the minimum of effort. New models of the Burdick Deep Therapy Lamps will also be shown as well as a complete line of Infra-red Generators.

during this meeting. Among the specialties to be demonstrated are Cameron's Electro-Cautery for major surgery, Cameron's Surgilites, and the im-



Cameron Electro-Diagnostic and Surgical Specialties will be exhibited in space number 7, by the CAMERON SURGICAL SPECIALTY COMPANY, of Chicago. A number of new and improved instruments developed during the past year will have their first demonstration to the medical profession

proved Cameron's Electro-Diagnostoset.

The JOHN V. DOEHREN COMPANY, of Chicago, in space 24, will exhibit a general line of X-ray accessories, especially the well known Gehler-Folie intensifying screens. The exhibit will be in charge of John Doehren,

who will be glad to meet old friends and make new ones.

The exhibit of the EASTMAN KODAK COMPANY, in space numbers 5 and 6, will consist of two general divisions, X-ray and Clinical Photography. Representative negatives made on the new Super Speed X-ray films will be displayed, as well as accessories for handling the films.

In the field of clinical photography, various routine cases which illustrate the value of photography will be shown.

The new Cine-Kodak, which is made for amateur motion pictures, will also be displayed. The exhibit will be under the charge of Mr. Millard Hodgson.

The ENGELN ELECTRIC COMPANY, of Cleveland, Ohio, will exhibit, in space number 30, a general line of roentgen accessories, their fluoroscope unit and dental unit. Henry Engeln will be in charge.

H. G. FISCHER & COMPANY, of Chicago, in space No. 33 will show apparatus for medical and surgical diathermy, specializing on their Portable Type "G," which they claim to be the most efficient and adaptable apparatus of its kind on the market, because it is light in weight, easily portable, has plenty of capacity, and is reasonable in price. They also will show one of their new Style "FO" Senior combination Physiotherapy Cabinets. This outfit is equipped with the new type Kolischer Spark Gap, which they believe is the only gap with which the real sedative diathermic technique may be employed.

The FRENCH SCREEN COMPANY, of Detroit, Mich., in space number 8, will exhibit the French Intensifying and Fluoroscopic Screens. They say that "the Radiologist should select this screens as the surgeon does his knife — nothing but the best possible — rather than risk his reputation upon price or sales talk."

Space number 21 will be occupied by the HANOVIA CHEMICAL AND MANUFACTURING COMPANY, of Newark, N. J., who will give an actual demonstration of the therapeutic quartz lamps, the Alpine Sun, and Kromayer. They will also show the new addition to their quartz light family, the Luxor Patient's Model Quartz Lamp. This lamp enables all patients, because of its low cost, to be benefited by the use of this modality. The lamp being simplified in construction, contains the burner and furnishes the rays the same as the Alpine Sun Lamp.

HORLICK'S MALTED MILK COMPANY, of Racine, Wisconsin, will exhibit in space number 11. They will demonstrate the new Model Six Dumore Mixer, "Horlick's," which they claim is the best electric mixer of its kind on the market, and greatly facilitates the preparation of Horlick's Malted Milk with barium sulphate, which is considered by many the best medium for opaque meal in roentgenologic diagnosis. Samples and literature will be supplied, and "smiling Dr. Hobart" will be pleased to answer all questions.

The KELLEY-KOETT MANUFACTURING COMPANY, of Covington, Kentucky, will show, in spaces 31 and 32, a number of new devices that will be novel and entirely different from anything shown before. Mr. J. Robert Kelley will be in charge, and this firm assures us that a number of surprises are in store for the visitors to this exhibit. They promise that they will have one of the best exhibits they have had at any meeting in years.

The LIEBEL-FLARSHEIM COMPANY, of Cincinnati, Ohio, will occupy space number 29, and exhibit two models of their Dynelectron—the model P Dynelectron for electro-coagulation, desiccation work, and high frequency current for medical diathermy and autocondensation; the model K Dynelectron, a recent development, intended for use by the specialists who

require electro-coagulation and desiccation modalities only. The exhibit will be in charge of Mr. G. H. Liebel.

The MIDDLEWEST LABORATORIES COMPANY, of Chicago, in space 10, will feature the Metabolimeter and accessories for making basal metabolic rate determinations. Demonstrations will be made on normal subjects, and the complete test followed through to the final result will require a total of less than five minutes. Clinical applications of the test will also be discussed for those unfamiliar with the subject. Dr. Horry Jones will be in charge.

The NATIONAL X-RAY SCREEN COMPANY, of Chicago, will occupy space No. 13, and will exhibit a series of films of unusual cases, made with the and of National Intensifying Screens.

The PATTERSON SCREEN COMPANY, of Towanda, Pa., occupying space number 28, will exhibit the Patterson Cleanable Intensifying Screen, and demonstrate the manner in which the surface of this screen resists dirt and soil. They will also show the Patterson Fluoroscopic Screen and the Patterson Operating Fluoroscope. Mr. Carl V. S. Patterson will be in charge of the exhibit.

JAMES PICKER, of New York City, will occupy space number 17. He will exhibit a general line of X-ray accessories and supplies for the radiologist. He will also show some of the smaller apparatus produced by the Acme-International X-ray Company.

In space number 22, the RADIUM CHEMICAL COMPANY, of Pittsburgh, Penn., will display various new clinical applicators in connection with the use of radium, and the clinical and operator's applicators to be used in connection with radium emanation. The radium emanation is a new service available to physicians. Mr. Fordyce will be in charge.

In spaces 18, 19, and 25 the STANDARD X-RAY COMPANY, of Chicago, will exhibit a new High Voltage Transformer, and a new type Combination Radiographic, Fluoroscopic Tilt Table showing many improvements. This is a new offering over any of the present types of apparatus now obtainable. They say that their exhibit should prove very interesting to the profession. Mr. Hettich ("Bill") will be in charge.

In space number 12, the SWEETBRIAR LABORATORIES, of Pittsburgh, Penn., will have a very interesting exhibit showing some of the methods used in the production of Sweetbriar Waterproof Intensifying Screens; as well as films demonstrating results obtained with the aid of Sweetbriar Screens.

VICTOR X-RAY CORPORATION, of Chicago, will exhibit, in spaces 1, 2, 3, and 4, the new Victor CDX unit, an oil immersed dental machine that is so compact in construction that it takes up a minimum amount of space, and is so easily operated that it is unquestionably one of the most distinctive and radical changes that has been made in the perfection of X-ray equipment in several years, according to their statement. They will also exhibit the Snook Special Combination Deep Therapy and Diagnostic unit. In addition, other apparatus will be available for inspection of those in attendance. A considerable part of their space will be devoted to the display of radiographs produced by their educational department.

WAPPLER ELECTRIC COMPANY, of Long Island City, New York, will exhibit in space number 20, some recent developments in X-ray apparatus, and promise some instructive and interesting information in regard to the physics of deep X-ray therapy. Dr. A. Mutscheller, physicist of the Wappler Research Laboratory, will be present and glad to discuss deep roentgen therapy with the visitors.

GENERAL INTEREST

Dr. Howard P. Doub is permanently identified with the Henry Ford Hospital, Detroit, as roentgenologist-in-chief.

A fellowship in the Curie Laboratory, Paris, has been founded by a scientific society of Bologna, Italy, carrying with it a yearly income of 6,000 francs. The endowment, which is for the term of ten years, is designed to encourage Italian students of physics and chemistry, who have given evidence of marked ability and who desire to do further research work.

The twenty-fourth annual meeting of the American Roentgen Ray Society, held at Chicago, September 18 to 21, was largely attended by the membership and foreign roentgenological specialists. Dr. Hollis E. Potter, of Chicago, took office as president.

In the case of *Jones vs. Sinsheimer*, 214 *Pac. R.*, 375, in the Supreme Court of Oregon, the defendant set up a claim that the trial court erred in admitting certain roentgenograms taken of the defendant's fractures, on the ground that said roentgenograms were not properly identified. The action was one to recover damages for personal injuries sustained by the plaintiff upon being struck by the defendant's automobile. The physician in the case, on the witness stand, testified, at the introduction of the roentgenograms in evidence, that they were actual plates made of the fractures sustained by the plaintiff. The effect of this testimony was to overrule the objection.

In the personal injury case of *McGrath vs. Fash*, 139 *N. E. R.*, 303, the Supreme Judicial Court of Massachusetts, in overruling the defendant's exceptions in an action to recover damages, stated that a physician who was acknowledged to be an expert roentgenologist was called as a witness by the plaintiff and gave testimony concerning certain roentgenograms said to have been made of the injured parts. The witness stated that the plates revealed an abnormal condition of the pelvic region, due, in his opinion, to fractured bones—the claim set up by the plaintiff. The expert witness also offered as evidence, and exhibited to the jury, a plate showing the pelvic region of a normal person, the object being to demonstrate wherein the roentgenogram of the plaintiff departed from normal, due, as claimed, to the injury sustained. The court ruled that there could be no objection to such comparative exhibit, to the end that the jury, composed of persons unfamiliar with the normal relationship of the pelvic bones, might make intelligent comparison with the roentgenograms introduced as evidence of the plaintiff's injury. The identification of the plate introduced for comparison was a question of fact to be ruled upon by the trial judge. In analogous cases, a skeleton has been admitted as an exhibit to aid in the determination of abnormality.

The physician who attended the plaintiff in the hospital, at the request of the defendant, testified as to the extent and nature of the injuries found by him, namely, the fracture of two pelvic bones. These, he testified, were "well set," though the pelvis "was tipped a little bit."

The plaintiff, called in rebuttal, testified that she had clear recollection of the witness, upon the occasion of his examining her in the hospital, stating that he had told another physician that "this was the worst accident case he had handled in the last ten years." On the request of the defendant that this statement be stricken out, the judge admitted it to record only so far as it constituted a contradiction of the witness's direct testimony.

ABSTRACTS OF CURRENT LITERATURE

Thomson Walker, Sir John: The Relation of Calcified Abdominal Glands to Urinary Surgery. *Lancet,* Lond., 1922, ii, 1213.

Thomson Walker during the last few years has examined 42 cases of urinary disease where calcified abdominal glands were found.

As regards diagnosis, with the complete X-ray examination of obscure abdominal cases that is now customary the discovery of calcified glands is becoming more common; but new difficulties have arisen in the interpretation of radiograms of the abdominal areas. The shadows thrown by calcified glands are most likely to be confused with those of stone in the renal pelvis or ureter, or with gall stones. If the outline of the kidney or gall bladder is shown in a radiogram, a shadow thrown by a stone in either organ may be localized or a shadow thrown by calcareous glands may be outside these areas and the diagnosis can then be made. The stereoscopic method will give valuable information in regard to the depth of the shadows from the surface, but this is not sufficiently accurate for the localization of a doubtful shadow in the kidney or gall bladder.

Very large shadows may be thrown by kidney stones or gall stones, but rarely by calcified glands. The larger shadows thrown by calcified glands are usually groups of shadows and not a single shadow.

As regards the density and uniformity of the shadow, a calcified gland or group of glands has in the average case a density midway between a urinary calculus and a gall stone. It is not so dense as a urinary calculus of the same size and is denser than a gall stone, but there are exceptions. Calcified glands throw a shadow irregular in density; when a large shadow is thrown it has a mottled appearance that distinguishes it from urinary calculi or gall stones; in a group of calcified gland shadows there is varying density in different parts. The shadow of a large calcified gland is not heavier than that thrown by a small gland. The shadow of a urinary calculus is homogeneous and the density varies with the size. The most characteristic form of gall-stone shadow has a central nucleus, a faint, somewhat irregular density in the body, and a dense ring in the periphery.

Shadows of multiple kidney calculi can usually be recognized as occupying the kidney pelvis or calyces. In gall stones where all the stones throw a shadow, a peculiar mosaic, or honeycomb pattern, is produced which is unmistakable.

By pyelography the doubtful shadow which may lie within the kidney area and actually within the limits of the kidney shadow may be proved to lie outside the kidney pelvis and calyces.

The two conditions which may cause confusion with the shadow of a kidney stone are gall stones and calcified abdominal glands. The gall-stone shadow lies well in front of the shadow of the vertebral bodies, usually at the level of the upper three lumbar vertebræ. The shadows of calcified abdominal glands may be as high as the kidney, but they are usually lower down, at the level of the third or fourth lumbar vertebra, and always in front of the bodies of the vertebræ. It should be noted in examining doubtful shadows in the abdomen that disease may alter the relations of the organs. Thus a shadow cast by a calculus in a mobile kidney may be found below the crest of the ilium. Mobility of the kidney may completely change the relation of the organ to the vertebral bodies in lateral radiography.

Lewin, P.: Juvenile Deforming Metatarsophalangeal Osteochondritis. *Jour. Amer. Med. Assn.,* 1923, lxxxi, 189.

Juvenile deforming metatarsophalangeal osteochondritis was first described by Freiberg in 1913 and is not very common, only 65 cases being described in the literature, mostly in the female sex.

The syptomatology is slight and to the roentgen-ray must go the credit of recognition of this condition. The findings are characteristic and are: (1) flattening of the metatarsal head; (2) broadening of the neck and distal portion of the shaft; (3) irregularity of the epiphyseal line; (4) widening of the metatarsophalangeal joint space; (5) diminished cupping of articular surface of proximate phalanx; and (6) occasional line of incomplete fracture without displacement. The complaint is metatarsalgia. The cause of the condition is bound up with trauma, circulatory disturbance and infection. The author thinks that the etiology is trauma affecting the bone and cartilage during a period of unusual growth and the condition is analogous to the Calvé-Perthes and Osgood-Schlatter disease, etc. The prognosis is good.

The author describes two personal cases in girls 12 or 14 years of age, with illustrative roentgenograms.

Golden, R.: The Alkali Reserve in "Roentgen-Ray Sickness." *Arch. Intern. Med.*, 1922, xxx, 629.

The exact cause of constitutional reactions after irradiation is not known. It has been assumed that acidosis is a factor. The author, in addition to some clinical tests, has carried out a number of experimental investigations in the Peter Bent Brigham Hospital upon dogs with a view of determining whether or not relatively moderate doses of roentgen rays were followed by the clinical signs of "treatment sickness" and a lowering of the alkali reserve of the blood. The dogs, besides being watched as regards behavior after different radiation exposures, were ultimately sacrificed to observe any organic changes. The conclusion reached by the author as to the result of the investigation is that no evidence that the constitutional reaction following irradiation with roentgen ray is associated with a lowered alkali reserve was found, in several determinations of the plasma carbondioxid combining power of four patients and in repeated determinations of the plasma carbondioxid content of three dogs.

Crouse, H. W.: The X-ray in Neurological Diagnosis: Its Shortcomings and Possibilities. *Amer. Jour. Roentgenol.*, 1923, x, 437.

Three per cent of newgrowths within the skull contain ample calcareous degeneration which is radiologically demonstrable. There is another 2 per cent of lesions of the central nervous system interpretable from an X-ray angle. Such lesions consist of the osteophytes of the inner plate of the calvarium, growths of the orbit, tumors within the sinuses, and dural tumors. Pathology of the hypophysis furnishes about 3 per cent which correlatively can be diagnosed by the X-ray. The summary of these three types of neurological lesions gives radiology an 8 per cent direct diagnostic aid ratio.

Ventriculography and spinal intra-arachnoid injections by air through their indirect aid in density shadings have brought the demonstration and the location of intracranial and intraspinal lesions through the X-ray to a fair 52 per cent as a diagnostic method, correlatively speaking.

There is a great opportunity in undifferentiated stupor cases for roentgenological effort. The separation of the traumatic from the toxic or nephritic type of case can be markedly aided by antero-posterior, postero-anterior and laterally made skiagrams of the skull. Each is a wet brain. Each is a stupor state due to compressions of base and cortex.

Careful X-ray technique will frequently demonstrate extra and subdural blood clots. The pressure of such differentiates compression from concussion.

The author shows the value of skiagraphy of the skull of the newborn in connection with Little's disease, fissure fractures, etc.

The spinal types of pathology differentiated for the neurologist by radiology, can be briefly listed under the head of the various forms of spinal spondylitis and newgrowths, each developing bone changes. Syphilis, whether congenital or in the adult, leaves its stamp upon cortex of bone. Bone changes are also demonstrable in infectious arthritis, carcinoma, sarcoma, and tuberculosis. All such radiologic findings must be studied in the light of the clinical history,—clinician and radiologist must be constant consultants.

There is a wonderful field for the radiologist in neurological diagnosis. Crouse suggests a new and separate branch of radiology, i. e., "Interpretology." It would seem logical that roentgenology should be subdivided into roentgenological pathology, roentgenological histology, and roentgenological physiological branches besides the ones at present pursued, and special lines of studies and practice are indicated.

Delherm, Laquerriere and Morel-Kahn: Radiologic Exploration of the Kidney; Pneumo-perinephros: A New Method (Sur un nouveau procede d'exploration radiologique du rein, le pneumo-perinephros). *J. de Radiol. et d'Elect.*, 1922, vi, 369.

Pneumo-perinephros, or perirenal emphysema, was first described by Carelli and Sordelli, of Buenos Aires, in 1921. The author has made a critical trial of this method of diagnosing renal conditions and of the results obtained from it.

Quite apart from any risks in the older method of pneumo-peritoneum observations can only be made of about two-thirds of the kidney, as this organ in its retro-peritoneal situation is not surrounded by the injected gas the same as intraperitoneal organs. The superior pole of the kidney does not benefit from the method. But in the Carelli-Sordelli method gas is injected in the entire perirenal adipose tissues and produces a condition in which an opaque picture of the whole kidney and even of the suprarenal capsule is obtained.

The point selected for puncture is just outside the apex of the second lumbar process at about 3 cms. from the median line and about 300 to 400 cc. of gas are injected; the gas used was carbon dioxide.

The authors have made some modification in the method. They make the puncture well outside the second lumbar process and directed outward and downward well away from the hilum of the kidney; and instead of using carbon dioxide the authors prefer to use oxygen, which is less quickly absorbed and has the advantage of allowing the examination to proceed with more tranquility on the part of the patient. The quantity injected scarcely exceeds 300-350 cc.

The authors have tried the pneumoperinephros method in 8 cases. In the majority of these the method has permitted them to observe the kidney picture in all parts and even its relations with the spleen and liver, which in ordinary methods are obstacles. Situation, form, dimensions, regularity of contours, adhesions, are all rendered visible. Pathological alterations, especially tumors, give images which the control of more extensive practice will allow to be clearly interpreted. A certain number of the radiograms obtained by the authors by this method are shown.

This method is one step farther in the road of progress. The classical methods need not be abandoned, but we have in this method a valuable means of help if the classical methods should fail.

Crane, A. W.: The Roentgenological Aspects of Achylia Gastrica.

Amer. Jour. Roentgenol., 1922, ix, 527.

The term *achylia gastrica* is commonly used in medical literature to mean a total absence of free HCL. In the author's paper it means an established chronic disease of the stomach characterized by the absence of free hydrochloric acid in the stomach contents during the whole of the digestive cycle.

The material which forms the basis of this article consists of 1,000 cases in which with few exceptions the stomach contents were obtained in 5 or 6 fractions at fifteen-minute intervals one-half hour after the Ewald test meal. All the physical and clinical findings in connection with each case, including an X-ray examination, were available for study.

The importance of achylia to the roentgenologist lies in the following points:

1. Its frequency in gastro-intestinal cases;
2. Its association with abdominal pain;
3. Its association with intestinal disturbances;
4. The difference in the interpretation of the same roentgen-ray signs according to whether or not achylia is present.

The frequency of achylia varies from 40 to 60 per cent in elderly patients, according to different authors. In the author's 1,000 cases the incidence of achylia was 12.6 per cent for all ages, but it is less frequent than hyperacidity; in fact, was less than half. In not a single case with achylia was an ulcer found later by operation or autopsy. If gastric ulcer does occur with achylia gastrica, the author thinks it must be exceedingly rare.

In 102 of the 158 patients with achylia there was pain, 69 being abdominal. The cases of achylia without pain make it doubtful if the achylia itself is often accountable for it. If achylia is present and if gastric cancer or syphilis can be excluded, look elsewhere than to the stomach for the pain's cause.

There may be something in achylia gastrica which predisposes to diarrhea, and the rapid expulsion of the barium meal, with intestinal hypermotility, may thus find a rational explanation.

When achylia is present the roentgenologist will do well to include the chest in his examination. In the author's series, 22 showed disease of the circulatory system and 8 showed tuberculosis. Dental sepsis was found in 25 cases.

One of the most important aspects of achlyia in roentgenological practice is its mimicry of the behavior of the stomach in duodenal ulcer. The duodenal and the achylia type of gastric peristalsis may often be indistinguishable. The acid control of the pylorus is, of course, in abeyance in achylia. This, in connection with the rapid expulsion of stomach contents and the often incomplete filling of the duodenal bulb, due to the rapid passage of the barium, may appear to give the symptom-complex and the bulbar deformity of ulcer of the duodenum. Carman and others have shown that bulbar deformity is not always necessary for the diagnosis of duodenal ulcer.

If in a given case epigastric hunger pain relieved by eating is found, a diagnosis of duodenal ulcer would be reasonable. But in the presence of achylia gastrica the roentgenologist should beware of such a diagnosis. If the stomach contents show a total absence of free HCL then the roentgenologist should never make the diagnosis of duodenal ulcer without doubly proving the existence of a characteristic deformity of the duodenal bulb and excluding adhesions, pressure, or reflex spasms as a cause of the deformity. In the author's

series of cases, as stated, no case of gastric or duodenal ulcer was found.

Crane reiterates the advantage of recognizing achylia gastrica in roentgenologic interpretations of gastro-intestinal findings. Achylia is associated with such an extraordinary series of pathological states that only very large series of cases would give anything like uniform findings. The frequency of achylia in patients over fifty years of age must result in the inclusion of many pathological conditions that have no necessary relation with the achylia itself. The author claims to show only in a general way the roentgenological aspects of this interesting secretory disorder of the stomach.

Scott, S. G.: A Method for the Opaque Meal Examination of the Stomach. *Arch. of Radiol. and Electrother.*, 1923, xxvii, 304.

The application of the opaque meal examination requires great care and attention and is beset with pitfalls. Deviations from the normal are very apt to be mistaken for pathological conditions and such errors can be avoided only by practical experience. The radiologist must realize his responsibilities and his opinion should always be based on sound evidence. If, therefore, his evidence is weak or incomplete he should have no hesitation in saying so.

The author has thoroughly tested the various current methods of test meal examination over a number of years. While practically all of them will indicate the presence of gross lesions they have proved to be of uncertain value in the diagnosis of very small gastric or duodenal ulcers. For some years the author has worked on a definite line of technique, *i. e.*, radioscopic palpation, which he thinks worthy of description as it has consistently given over 94 per cent of correct diagnoses. In a large hospital such as that in which the author works, the method of testing must be rapid and accurate and the expense reduced to a minimum but without sacrificing accuracy.

Generally speaking the author thinks it is unnecessary for the radiologist to know the clinical history of a case, and quotes Carman of the Mayo Clinic in support of this. He has also been forced by practical experience to credit radiographs with but secondary importance in gastric conditions; any lesion demonstrated on a radiograph would easily be diagnosed by radioscopic palpation, but the reverse does not hold good.

The two chief advantages of radioscopic palpation are that it can be carried out with rapidity, and that it is extremely accurate in the detection of small lesions. In a straightforward case, such as a duodenal ulcer, a diagnosis can be given in five minutes, and the author has been able to examine as many as twelve gastric cases in the course of an hour.

The statistics of 94 per cent of correct findings are based on cases which have passed through the author's hands within the last two years in which diagnosis has been confirmed either by operative findings or by post-mortem examination.

The patient receives a vegetable purgative 36 to 48 hours before examination and is then put on a light diet. A special type of test meal is used. This barium cream is made in three thicknesses: thick and flavored, for œsophageal cases; medium thick and flavored, for gastric cases; thin and unflavored, for opaque enemata. Their composition is as follows:

Thick:

Barium Sulphate	10 oz.
Saccharin	2 grains
Vanillin	5 grains
Gum Tragacanth	100 grains
Distilled Water to.....	20 oz.

Medium Thick:

Barium Sulphate	10 oz.
Saccharin	2 grains
Vanillin	5 grains
Gum Tragacanth	60 grains
Distilled Water to.....	20 oz.

Thin unflavored:

Barium Sulphate	10 oz.
Gum Tragacanth	60 grains
Distilled Water to.....	20 oz.

About 3 to 4 ounces of the mixture is given at first, and a further 6 ounces can be administered later as required. This is necessary if the whole intestinal tract is to be examined.

The author has not found that investigation of the rate of emptying of the stomach gives any reliable information as to the state of the organ itself. Repeated examinations to determine this have, therefore, been discarded. The method of double meals has also been discarded. The actual radioscopic palpation should be done with the flat of the fingers, not with the tips, to avoid reflex contraction of abdominal muscles. The palpation is the important factor of the method and practice is necessary before the knack is acquired. The hands must be trained to work in conjunction with each other as each section of the stomach is examined in detail. The patient is examined

in both the upright and horizontal positions. The patient does not begin to drink the opaque mixture till he is in the proper position beneath the screen and its progress is watched.

The author describes the various stages of the examination in detail. He thinks that the radioscopic method in gastric work has not been developed to anything like the extent of radiography, but that its value will eventually prove to be even greater than that of radiography.

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Annual Meeting

Radiological Society of North America

Rochester, Minnesota

December 3-4-5-6-7, 1923

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NOTICE

An unfortunate typographical error occurrs in the editorial staff page on inside front cover of the December number of Radiology.

The name of Maximilian John Hubeny, M.D., should be shown as editor instead of Benjamin H. Orndoff, M.D., associate editor. No change has been made in the editorial staff of Radiology.

This mistake happened through circumstances beyond our control and we are at this time unable to account for it.

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